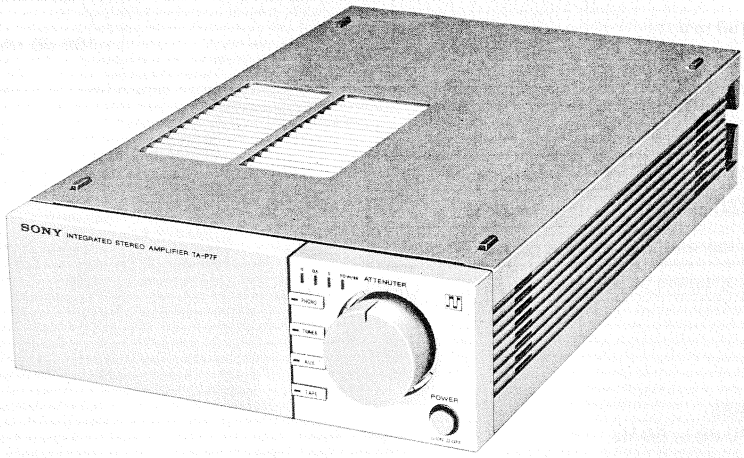
TA-P7F

952

US Model
AEP Model
UK Model



INTEGRATED STEREO AMPLIFIER

SPECIFICATIONS

GENERAL

System: Preamplifier section — low noise NF type equalizer amp; NF type tone control
Power amplifier section — pure-complementary SEPP dc power amplifier with all stages direct coupled
Power supply section — pulse power supply circuitry; regulated power supply for preamp

Power Requirements: 120 V ac, 60 Hz (US model)
220 V ac, 50/60 Hz (AEP model)
240 V ac, 50/60 Hz (UK model)

Power Consumption: 90 W (US model)
200 W (AEP model)
280 W (UK model)

AC Outlets: 1 switched 100 W
2 unswitched 100 W

Dimensions: 215(w) x 80(h) x 330(d) mm
8½(w) x 3¼(h) x 13(d) inches
including projecting parts and controls

Weight: 3.6 kg (7 lb 15 oz) net
3.9 kg (8 lb 10 oz) in
shipping carton

POWER AMPLIFIER SECTION

Continuous RMS Power Output: At 20 Hz – 20 kHz
(Less than 0.01% THD, both channels driven simultaneously) 50+50 W (8 Ω)
(AEP, UK model)

Power Output and Total Harmonic Distortion: With 8 Ω loads, both channels driven from 20 Hz – 20 kHz; rated 50 W per channel minimum RMS Power, with no more than 0.01% total harmonic distortion from 250 mV to rated output (US model)

Harmonic distortion: Less than 0.01% at rated output
Less than 0.008% at 10 W output

Intermodulation (IM) distortion: Less than 0.01% at rated output
(60 Hz : 7 kHz = 4 : 1) Less than 0.008% at 10 W output

Residual noise: Less than 50 μV (8 Ω, Network A)

Damping factor: 50 (8 Ω, 1 kHz)

Frequency Response: PHONO: RIAA equalization curve ±0.2 dB
TUNER, TAPE, AUX: 5 Hz – 60 k Hz $^{+0}_{-1}$ dB

— Continued on page 2 —

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

SONY®

SERVICE MANUAL

952

Inputs:

		Sensitivity	Impedance	Phono overload (0.1% distortion 1 kHz)	S/N (Weighting network, input level)
PHONO	MC	0.25 mV (–70 dB)	100 Ω	12 mV	75 dB (A, 0.25 mV)
	MM	2.5 mV (–50 dB)	50k Ω	120 mV	88 dB (A, 2.5 mV)
TUNER AUX TAPE		150 mV (–15.5 dB)	50k Ω	–	100 dB (A, 150 mV)

Outputs:

	Voltage	Impedance
REC OUT	150 mV	4.7k Ω
HEADPHONES	Accepts low and high impedance headpnones.	
SPEAKERS	Accepts speakers of 8 – 16 Ω.	

PREAMPLIFIER SECTION

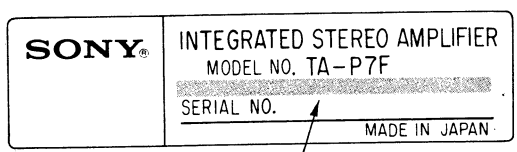
Tone Controls: BASS
±10 dB at 60 Hz
(turnover frequency 300 Hz)
TREBLE
±10 dB at 25 kHz
(turnover frequency 5 kHz)

Acoustic Compensator (att. 30 dB): LOUDNESS +10 dB at 80 Hz, +6 dB at 10 kHz
BASS BOOST 1: +10 dB at 40 Hz
BASS BOOST 2: +10 dB at 80 Hz

Low Filter: 6 dB/octave attenuation below 15 Hz
(operative only for phono input signals)

MODEL IDENTIFICATION

– Specification Label –



AC 120V	60 Hz	90W	. . . US model
AC 220V~	50/60 Hz	200W	. . . AEP model
AC 240V~	50/60 Hz	280W	. . . UK model

SERVICING NOTE

• Handling Precautions for MOS ICs

Generally, the insulation resistance of the oxide layer in MOS IC structures is very high, and the oxide layer is very thin. Because of this, it is possible that the static voltages usually present on clothes and the human body will be enough to generate a potential difference across the insulator, high enough to cause a breakdown of the insulating layer.

The following precautions should be taken while handling these ICs.

(Particular care should be taken under conditions of low humidity.)

Precautions in Replacing MOS ICs

1. Store new ICs by inserting them into a urethane-polyester cushion (which is somewhat conductive), or wrapping it in aluminum foil, so that all the pins are at the same potential.
   (The ICs should be stored in that manner until mounted on the circuit board.)

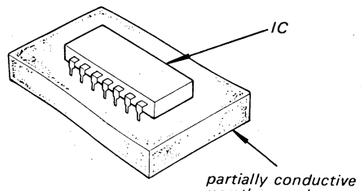


Fig. A

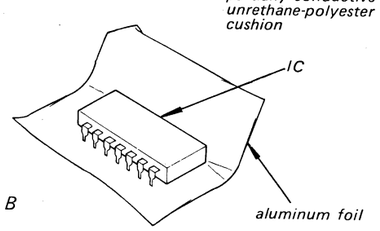


Fig. B

2. Check the soldering iron for possible power-line leakage current. Make sure that there is no leakage path by connecting an ohmmeter to the tip of the soldering iron and the plug as shown in Fig. C. If there is a leakage path, use some other soldering iron.

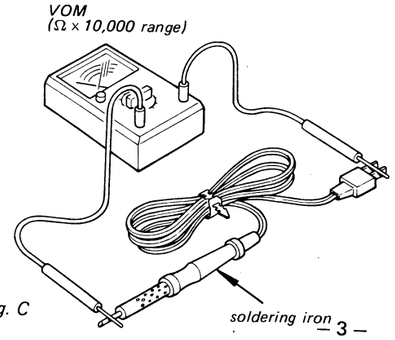


Fig. C

3. Equalize any potential difference between the clothes, the tools in use, the work bench, the set being worked on, and the packaged IC by touching them all in succession with the hands or a conductive wire or tool.
4. The following are effective methods for handling ICs that remove the potential difference across the oxide layer.
   • Use a paper clip modified by soldering in a wire braid insert.

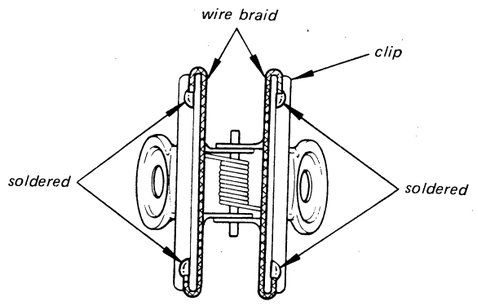


Fig. D

Make sure that there is no solder on the inside.

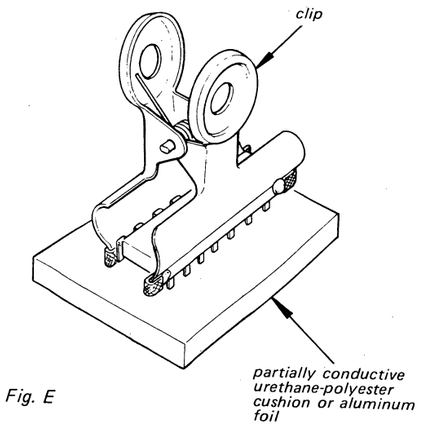
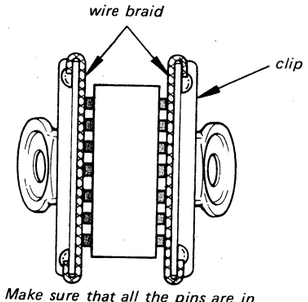


Fig. E



Make sure that all the pins are in contact with the wire braid (all the pins will then be at the same potential.).

Fig. F

• Take a short length of fine bare wire and wind it around the IC so that it shorts all the pins of the IC, while it is still in the urethane-polyester cushion or aluminum foil. This ensures that all the pins are at the same potential.

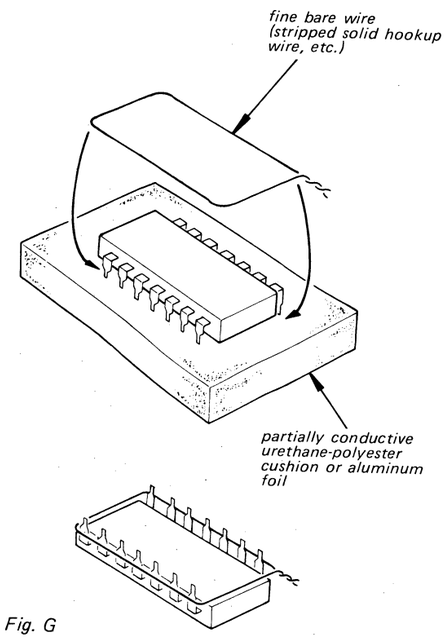


Fig. G

• When it is necessary to handle the IC with the fingers, do not touch any pin, and hold the IC at the ends of its plastic-package case as shown in Fig. H.

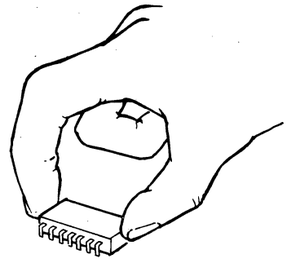


Fig. H

5. Method of Mounting
   Insert the IC while holding it with the modified clip, and solder all the pins with the clip still shorting the pins. (Similarly, solder all the pins while the bare shorting wire is still wound around them.). Remove the clip or the bare shorting wire only after all the pins have been soldered.

Precaution while Checking C-MOS ICs

The C-MOS ICs (Complementary MOS) are MOS ICs that have their output sections made up of N-channel and P-channel push-pull stages to increase their speed of operation. If the output terminal of these ICs comes into contact with B+ or B– voltage, then the FET which is ON at that time will either become shorted or open.

This is valid for all the output sections that are connected together by the interconnections. Even the circuits that are physically separated (and not on the same board) can be destroyed simultaneously.

Example:

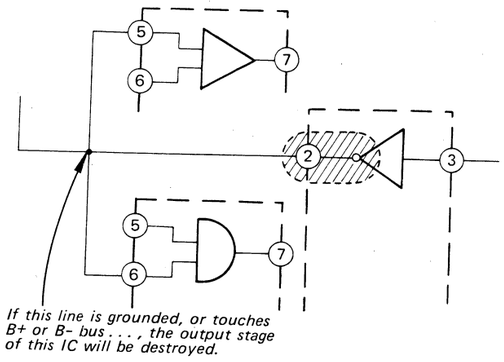


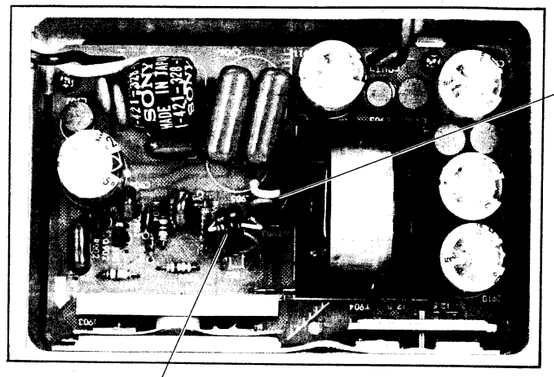
Fig. I

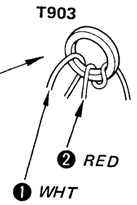
- **Inverter Transformers Replacement**

Important precautions to take while replacing transformers in the pulse power supply:

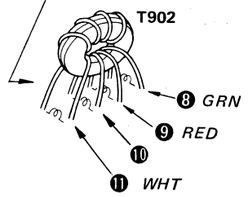
Lead wires from each of the transformers T902 and T903 in the inverter circuit are identified below.
Only cores with no windings are supplied as replacement parts for T902 and T903. If the transformers prove faulty for any reason, it is possible to make new transformer assemblies by referring to the illustration below. Cut the lead wires to the same length.

US model



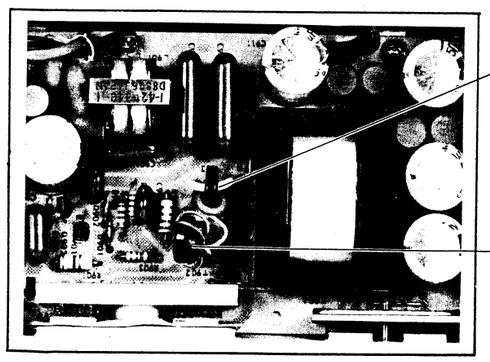


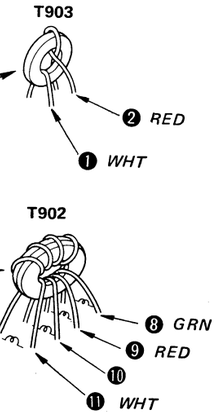
Core of T903 (1-543-100-00)
❶ : one-turn winding, wire length 40mm ($1\frac{5}{8}$")
UL-1430, AWG-22
❷ : two-turn winding, wire length 55mm ($2\frac{1}{4}$")
UL-1430, AWG-22



Core of T902 (1-543-098-00)
❽ : two-turn winding, wire length 70mm ($2\frac{7}{8}$")
UL-1061, AWG-28
❾ : two-turn winding, wire length 70mm ($2\frac{7}{8}$")
UL-1061, AWG-28
❿ : four-turn winding, wire length 115mm ($4\frac{5}{8}$")
polyurethane sheathed wire
⓫ : one-turn winding, wire length 50mm (2")
UL-1061, AWG-28

AEP, UK model





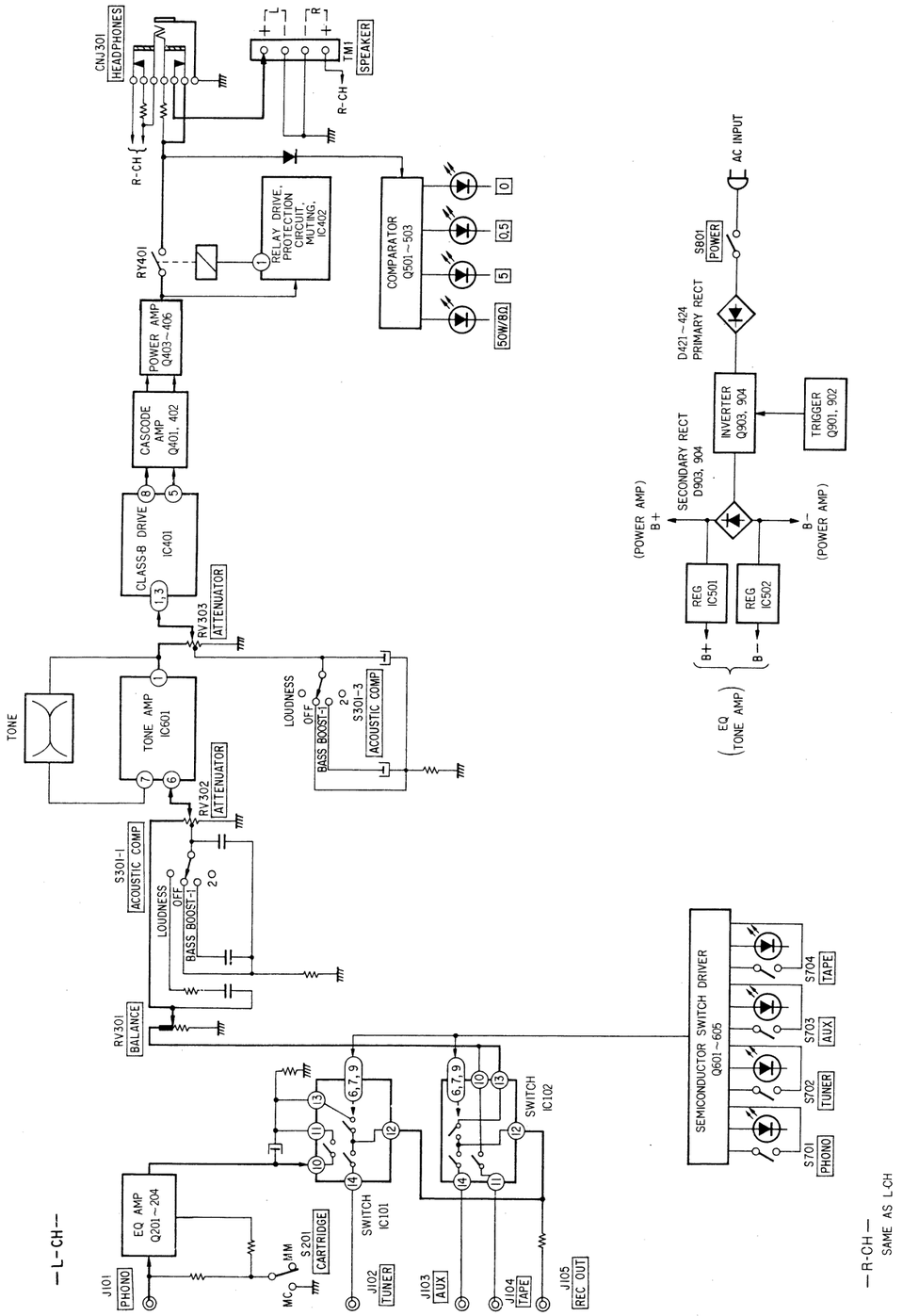
Core of T903 (1-543-100-00)
❶ : one-turn winding, wire length 40mm ($1\frac{5}{8}$")
UL-1430, AWG-22
❷ : two-turn winding, wire length 55mm ($2\frac{1}{4}$")
UL-1430, AWG-22

Core of T902 (1-543-098-00)
❽ : two-turn winding, wire length 70mm ($2\frac{7}{8}$")
UL-1061, AWG-28
❾ : two-turn winding, wire length 70mm ($2\frac{7}{8}$")
UL-1061, AWG-28
❿ : four-turn winding, wire length 115mm ($4\frac{5}{8}$")
polyurethane sheathed wire
⓫ : one-turn winding, wire length 50mm (2")
UL-1061, AWG-28

〔MEMO〕

SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM



1-2. TECHNICAL FEATURE

HEAT PIPE

Model TA-P7F uses a heat pipe to dissipate the heat generated by the power transistors. The heat pipe has been developed for use in spacecraft and can absorb heat very well. It is composed of a special fluid under low atmospheric pressure in an airtight container.

The operating principle of the heat pipe is illustrated in Fig. 1. One part of the pipe is the heat input or evaporation section, and the other part is the heat output or condensation section.

As heat is applied to the heat input section, the fluid in that section evaporates and is conveyed to the heat output where it condenses. From there it returns to the heat input section as fluid. This cycle takes place continuously, and allows very rapid heat conduction.

A heat pipe can dissipate heat from a power transistor several hundred times faster than the aluminum or copper of a conventional heat sink. For this reason a heat pipe has a cooling capacity 50 % higher than a heat sink.

Use of a heat pipe also permits the power transistor to be cooled without (detaching it) from the circuit board, and, as a result, the electromagnetic waves generated by the large signal current flowing in the leads are much decreased, and the distortion factor and signal-to-noise ratio of the power amplifier are improved.

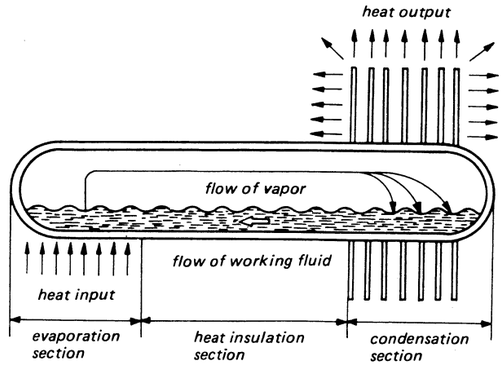


Fig. 1

1-3. CIRCUIT DESCRIPTION

This integrated stereo amplifier uses a semiconductive switching integrated circuit (CX770: IC101 and IC102) as a function switch and a monitor switch. This switch turns on/off the input signal under dc control, so the amplifier can be internally self-controlled, permitting considerably shortened singal lead wires and the reduction of the number of wires. Thus, it is possible to check the deterioration of sound quality which would normally occur from the routing of signals along many long lead wires.

CX770 is an N-channel SIPOS gate (Semi-Insulating Polycrystalline Silicon) MOS IC. SIPOS is a high-resistance layer of a mixture of polycrystalline and SiO_2. See Fig. 1 below.

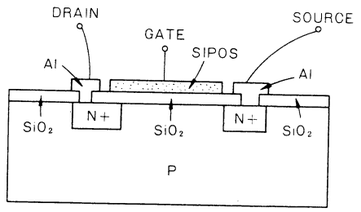


Fig. 1 Basic Construction of Semiconductive Switching IC

Generally, in an FET which uses an aluminum electrode as a gate, the channel resistance is changed with the signal level when the FET is switched on, resulting in a variation of the internal potential between the channel and the SOURCE.

CX770 employs a high-resistance layer as a gate electrode, and so no modulation is generated in channel, even for a signal of a shorter duration than a time constant determined by the capacity between the gate and channel and the gate registance. This results in low distortion. A further advantage of this IC is its switching speed of between 20-50 msec, an optimum speed for audio.

Fig. 2 illustrates a block diagram of CX770.

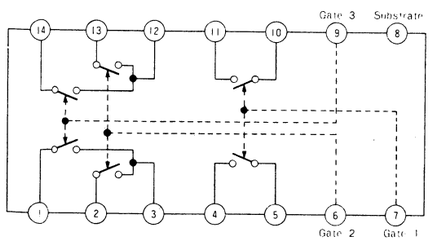


Fig. 2 Block Diagram of CX770

By changing the signal level at each gate from −15V to 15V, each circuit, which is OFF, turns ON. Of course the contrary is true: if the level is changed from 15V to −15V, the circuit will switch from ON to OFF.

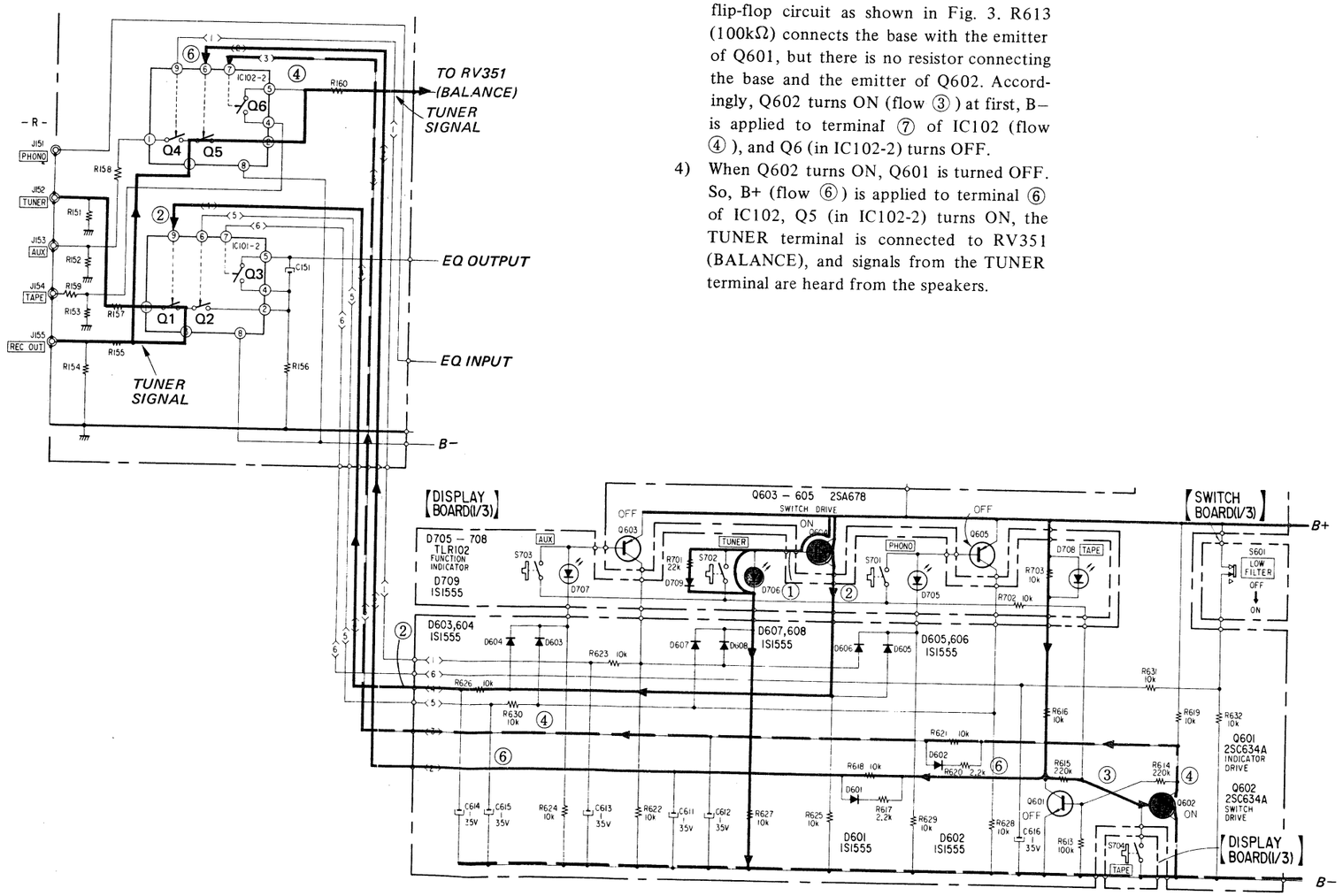


Fig. 3

Description of the peripheral circuitry of the semiconductive switching IC CX770 (IC101 and IC102).

1. **When the POWER switch (see Fig. 3) is turned ON;**
   1) Bias voltage is applied to the base of Q604 (flow ①) which will be turned ON, and the light emitting diode D706 is illuminated.
   2) When Q604 is ON, B+ (flow ②) is applied to terminal ⑨ of IC101, and the signal from Q1 (in IC101-2) is delivered at REC OUT. (When this amplifier's power switch is turned on, the tuner input circuit is activated.)
   3) On the other hand, Q601 and Q602 form a flip-flop circuit as shown in Fig. 3. R613 (100kΩ) connects the base with the emitter of Q601, but there is no resistor connecting the base and the emitter of Q602. Accordingly, Q602 turns ON (flow ③) at first, B− is applied to terminal ⑦ of IC102 (flow ④), and Q6 (in IC102-2) turns OFF.
   4) When Q602 turns ON, Q601 is turned OFF. So, B+ (flow ⑥) is applied to terminal ⑥ of IC102, Q5 (in IC102-2) turns ON, the TUNER terminal is connected to RV351 (BALANCE), and signals from the TUNER terminal are heard from the speakers.

2. When the PHONO button (S701) is pressed (see Fig. 4):

1) Q605 turns ON, and LED D705 is illuminated (flows ①, ②).
2) When Q605 turns ON, D607 causes D706 to turn OFF.
3) Further, when Q605 turns ON, B+ (flow ⑤) is applied to terminal ⑥ of IC101, and Q2 (in IC101-2), which has been OFF, turns ON. Consequently, the signals from the PHONO terminal appear at REC OUT.
4) Since Q602 is ON while Q604 is OFF, B+ is applied to terminal ⑥ of IC102, and Q5 is turned ON.
5) Signals from the PHONO terminal are heard from the speakers.
6) When D706 is turned OFF, Q604 is also turned OFF. So terminal ⑨ of IC101 becomes B− potential. Q1, which has been ON, is turned OFF, and signals from the TUNER terminal are not heard from the speakers.

3. When the AUX button (S703) is pressed (see Fig. 4):

1) Just in 2 above, Q603 turns ON and LED D707 is illuminated (flows ③ and ④).
2) When Q603 turns ON, D606 causes LED D705 to turn OFF.
3) Also, when Q603 is turned ON, B+ (flow ⑥) is applied to terminal ⑨ of IC102, Q4 turns ON, and REC OUT receives the signal from the AUX terminal.
4) Since Q602 is ON while Q601 is OFF, B+ is applied to terminal ⑥ of IC102-2. Q5 turns ON, and signals from the AUX terminal are heard from the speakers.
5) When D705 turns OFF, Q605 is also turned OFF. So, the potential on terminal ⑥ of IC101 becomes B−. Q2, which has been ON, is turned OFF, and signals from the PHONO terminal are not heard from the speakers.

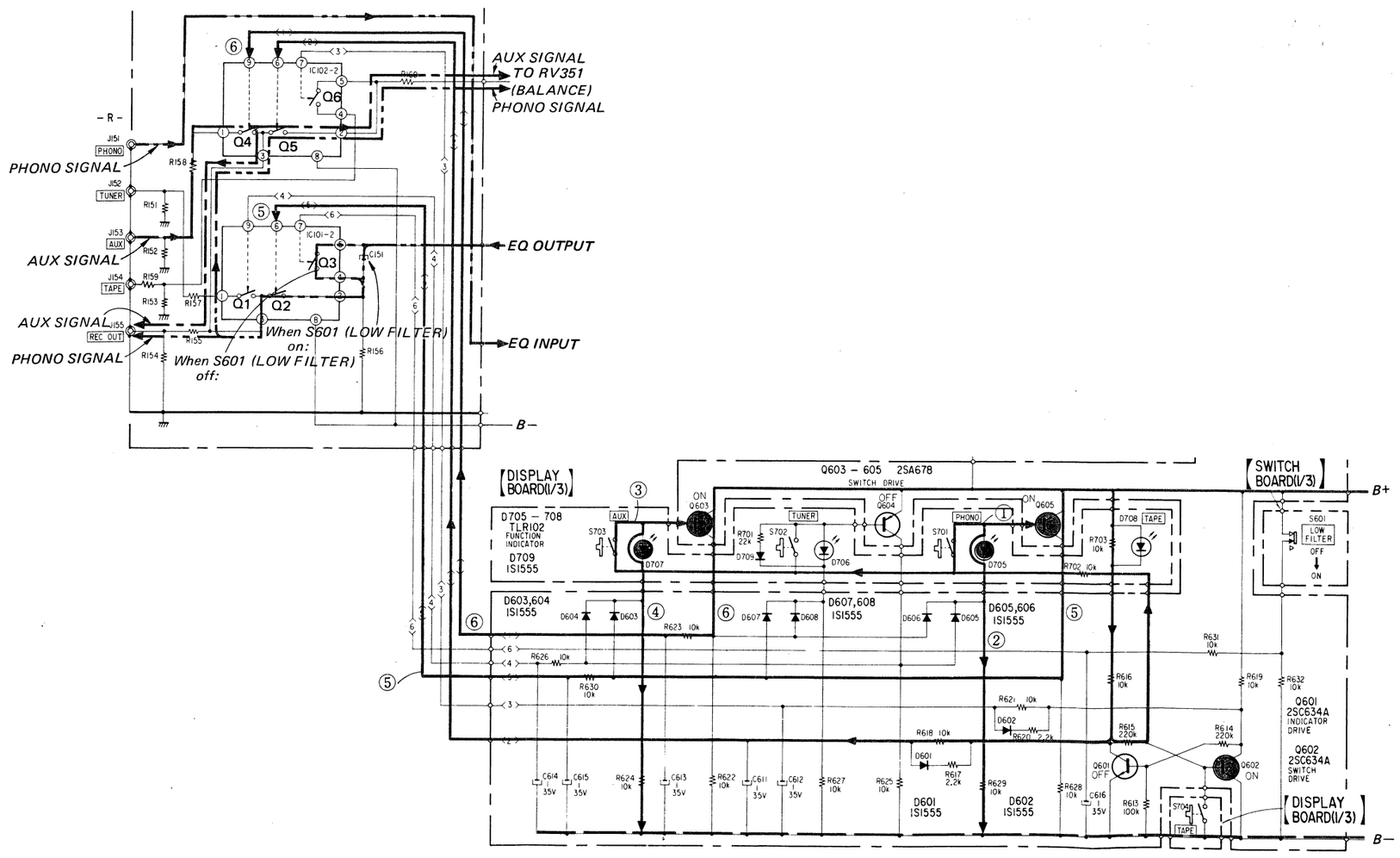


Fig. 4

4. When the TAPE button (S704) is pressed (see Fig. 5):

1) Q602 is turned OFF, and B+ is applied to terminal ⑦ of IC102. Q6, which has been OFF, is turned ON, and the TAPE terminal is connected to RV351 (BALANCE) so that the signals from the TAPE terminal are heard from the speakers (flow ①).
2) When Q602 is turned OFF, Q601 turns ON and LED D708 is illuminated (flow ②).
3) Consequently, B– is applied to terminal ⑥ of IC102, and Q5, which has been ON, is turned OFF. So the REC OUT terminal is disconnected from the signal bus (flow ②).
4) D601 shortens the time required of terminal ⑥ of IC102 to change level from B+ to B–, [namely] the time for Q5 to switch from ON to OFF is speeded.
5) When terminal ⑥ of IC102 is changed from B– to B+, switching is slowed down. Q5 switches more slowly from OFF to ON than the reverse. By speeding up the switching of Q5 from ON to OFF and slowing down the switching of Q6 from OFF to ON, oscillation caused by mis-connecting the amplifier's REC OUT with TAPE of a tape recorder so that a loop is formed is avoided.

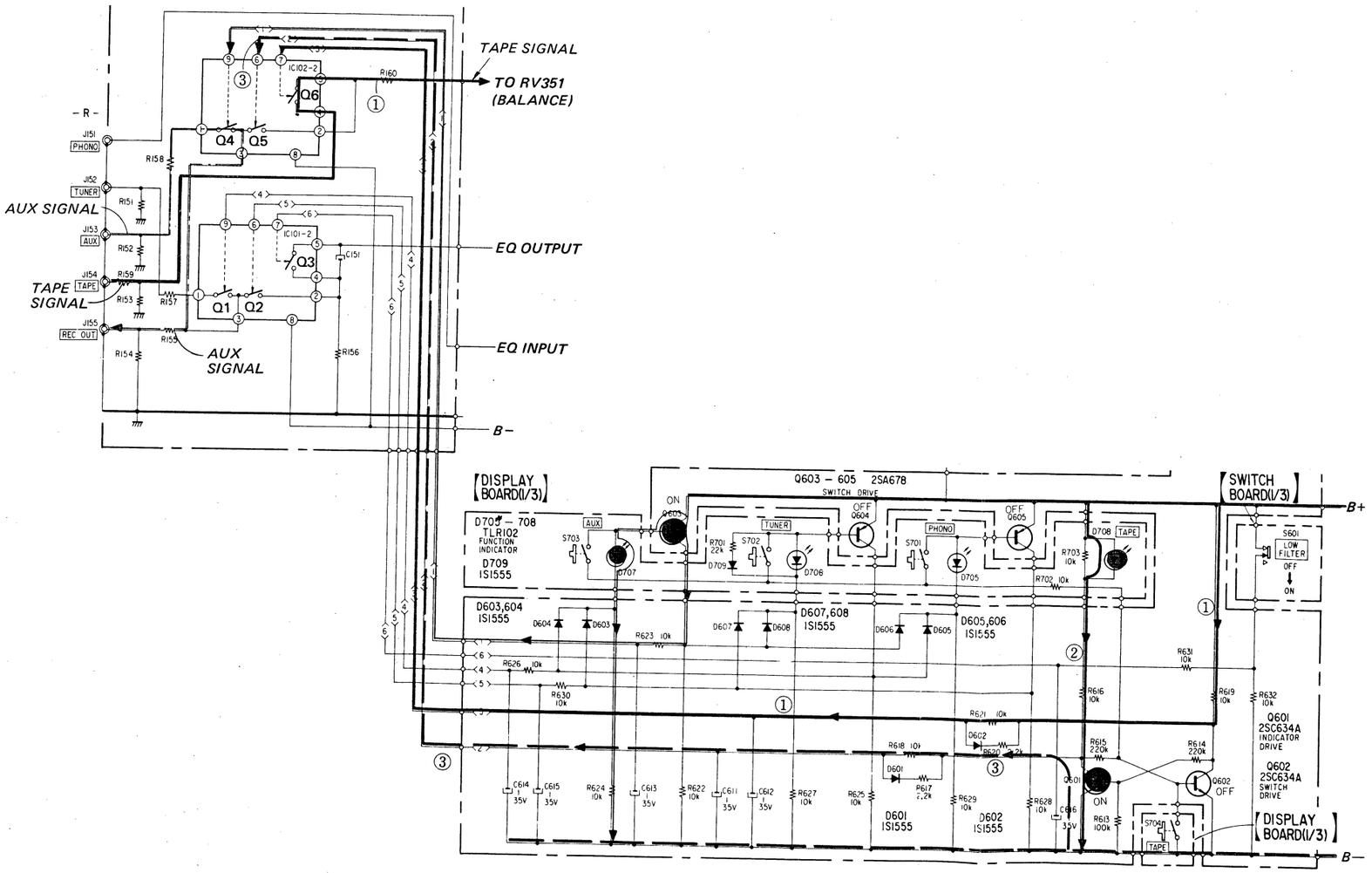
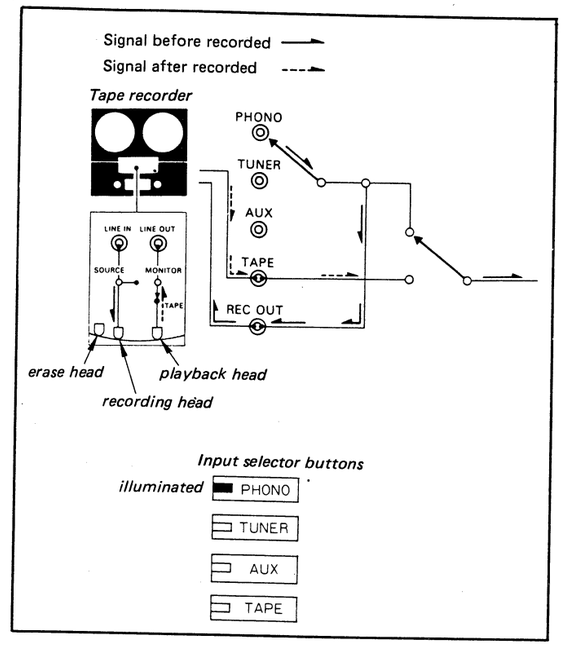


Fig. 5

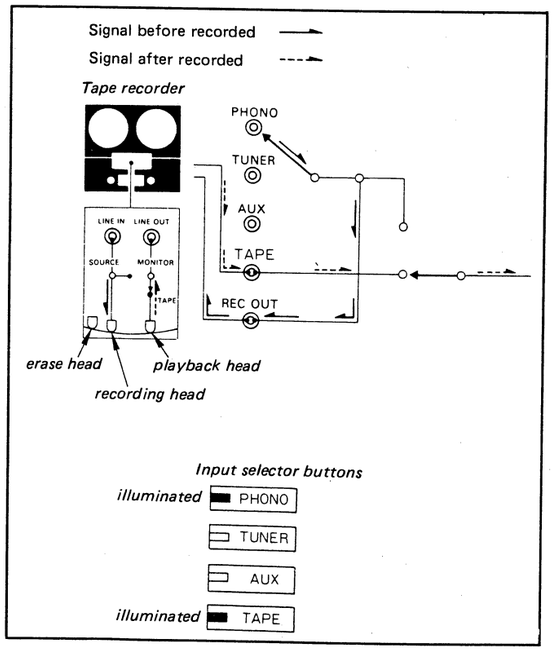
Recording monitor

By recording with a 3-head tape recorder, recorded signals may be simultaneously reproduced for monitoring purposes. While a playing record is being recorded, the input selector switch is left set to PHONO and the signals before recorded will be heard from the speakers. But when the TAPE button is pressed, recorded signals will be reproduced and heard from the speakers. If the PHONO button is pressed again the TAPE button will be released so that the signals may be heard before they are recorded. In order to monitor the recorded signals, switch the MONITOR switch to TAPE.

When only the PHONO button is pressed (in order to monitor the source):



When PHONO and TAPE buttons are pressed (in order to monitor the tape signal):

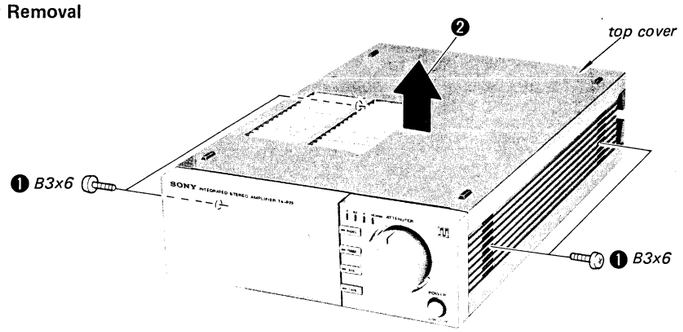


Similarly, TUNER and AUX inputs can be monitored.

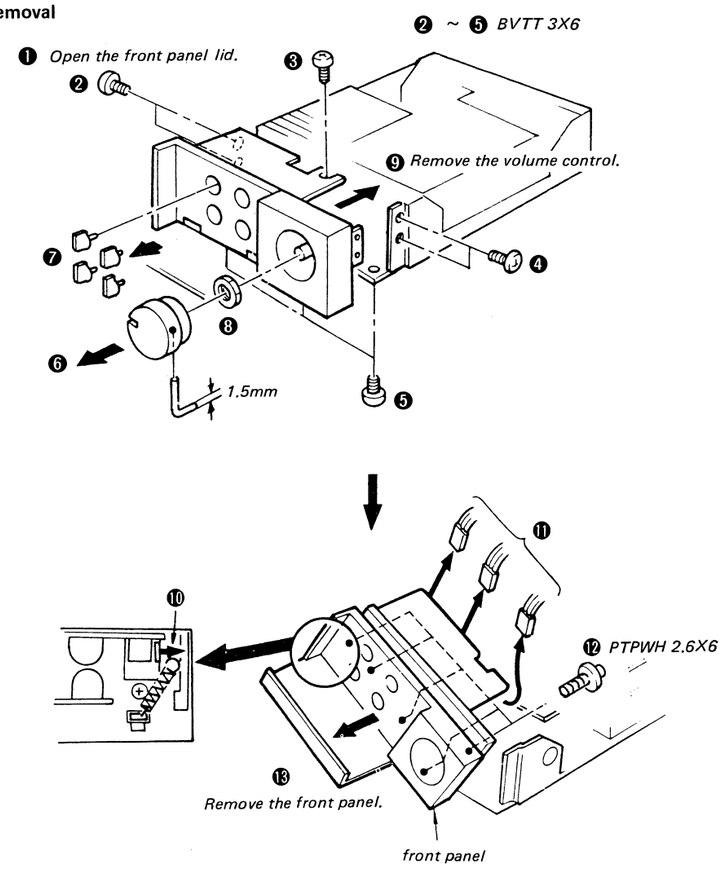
SECTION 2
DISASSEMBLY

- Follow the disassembly procedure in the numerical order given.

Top Cover Removal

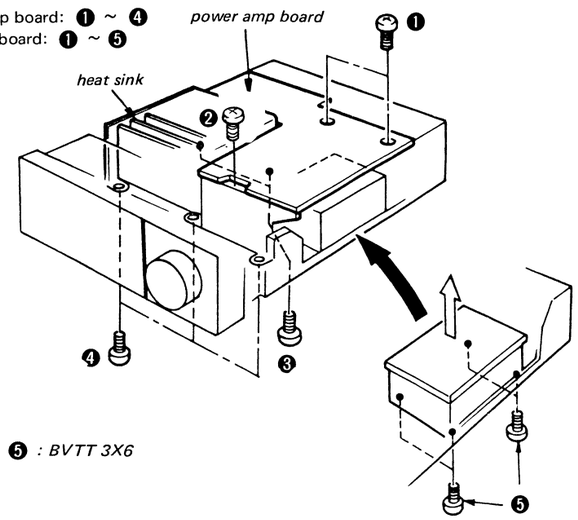


Front Panel Removal



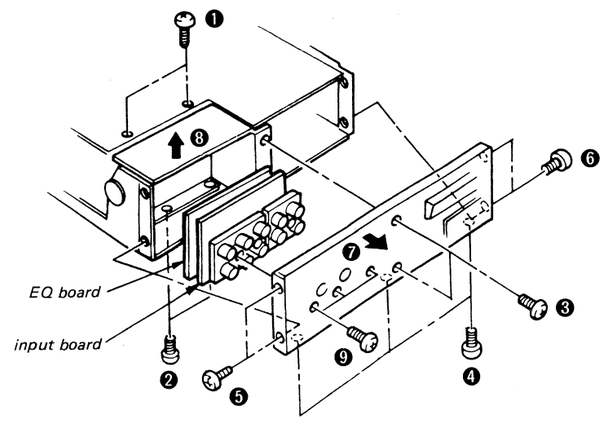
Heat Sink, Power Amp Board and Pulse Power Supply Board Removal

heat sink, power amp board: ❶ ~ ❹
pulse power supply board: ❶ ~ ❺



❶ ~ ❺ : BVTT 3X6

Input Board and EQ Board Removal



❶ ~ ❻ : BVTT 3x6
❾ : P3x8

NOTE:

1. DC BIAS a should be n after the PO
2. Repeat DC ments two c
3. After repea BIAS and should be pe

SECTION 3
ADJUSTMENTS

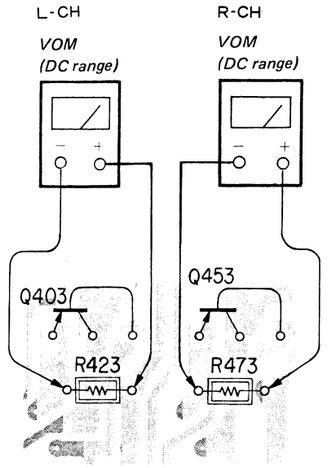
NOTE:

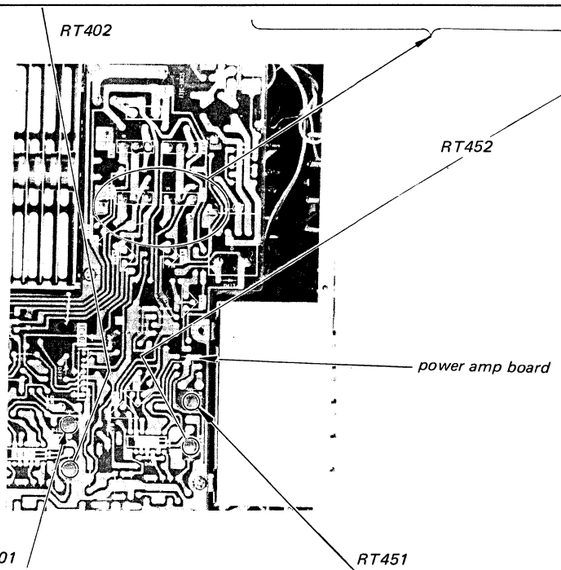
1. DC BIAS and DC BALANCE adjustments should be made about several minutes later after the POWER switch is turned on.
2. Repeat DC BIAS and DC BALANCE adjustments two or three times.
3. After repeating the power transistors, DC BIAS and DC BALANCE adjustments should be performed.

DC Bias Adjustment

Procedure:
Adjust RT402 (L-CH) and RT452 (R-CH) for 10mV readings with no signal input.

Adjustment Location:

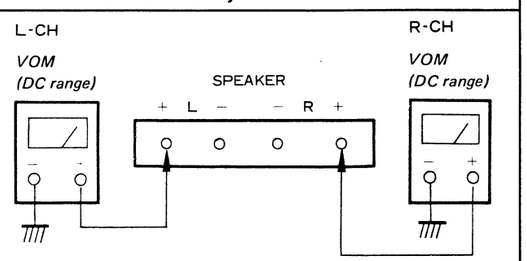




DC Balance Adjustment

Procedure:
Adjust RT401 (L-CH) and RT451 (R-CH) for 0V readings with no signal input.

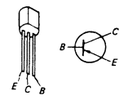
Adjustment Location:



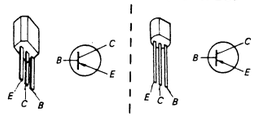
SECTION 4
DIAGRAMS

- **Replacement Semiconductors**
  For replacement, use semiconductors except in ( ).

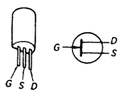
Q201, 251: 2SA1066



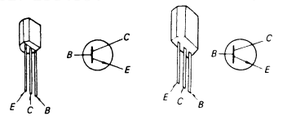
Q406, 456: 2SA1027R (2SA733)



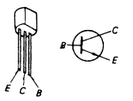
Q202, 252, Q204, 254: 2SK43-04



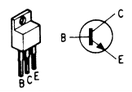
Q902: 2SC1364 (2SC634A)



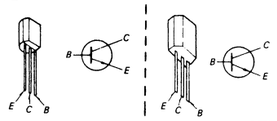
Q203, 253: 2SC1345



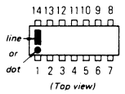
Q903, 904: 2SC2440



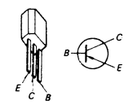
Q401, 451, Q601, 602: 2SC1364 (2SC634A)



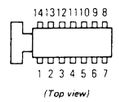
IC101, 102: CX770



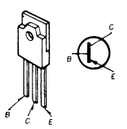
Q402, 452, Q501–503, Q603–605, Q901: 2SA1027R (2SA678)



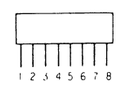
IC401, 451: CX171



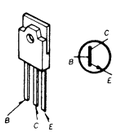
Q403, 453: 2SA1097



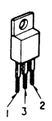
IC402: HA12002
IC601, 651: HA1457



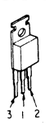
Q404, 454: 2SC2571



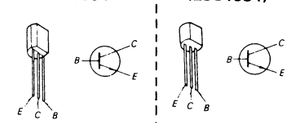
IC501: μPC14315H



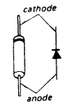
IC502: FS7915M



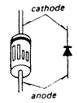
Q405, 455: 2SC1364 (2SC1634)



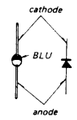
D201, 251, D409, 459, D410, 460, D415, 465, D601–608, D709, D901, 902: 1S1555
D406, 456, D407, 457: 1S2076A
D408, 458: 1T22AM
D413: 1S1555 (1S2076)



D202: EQB01-13 (EQA01-13R)
D401, 451: EQB01-15 (EQA01-15R)
D412: EQB01-22 (EQA01-22R)

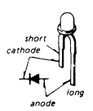


D404, 454, D405, 455, D501: MV12N

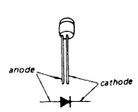


D421, 422, D423, 424: U05G (U05E)

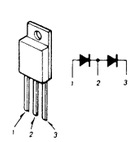
D701–704: TLG124



D705–708: TLR102



D903, 904: CTU22U

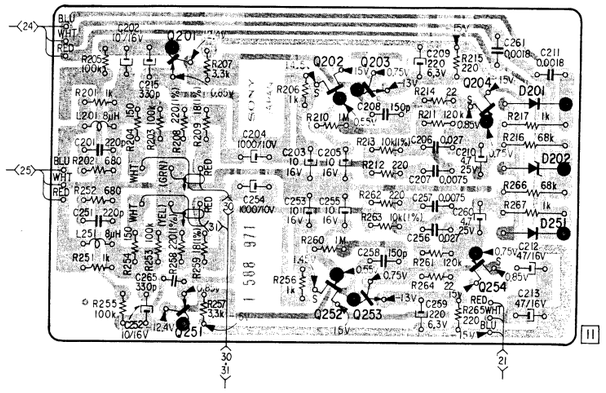


4-1. MOUNTING DIAGRAM — *Conductor Side* — (US model)

Refer to page 18 for replacement semiconductors and page 26 for note.

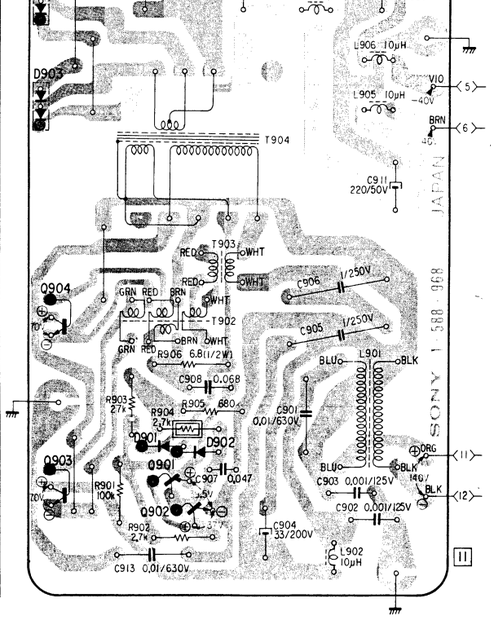
【EQ BOARD】(CONDUCTOR SIDE)

Q	201 251	202 252	203 253	204 254	
D					201 202 251



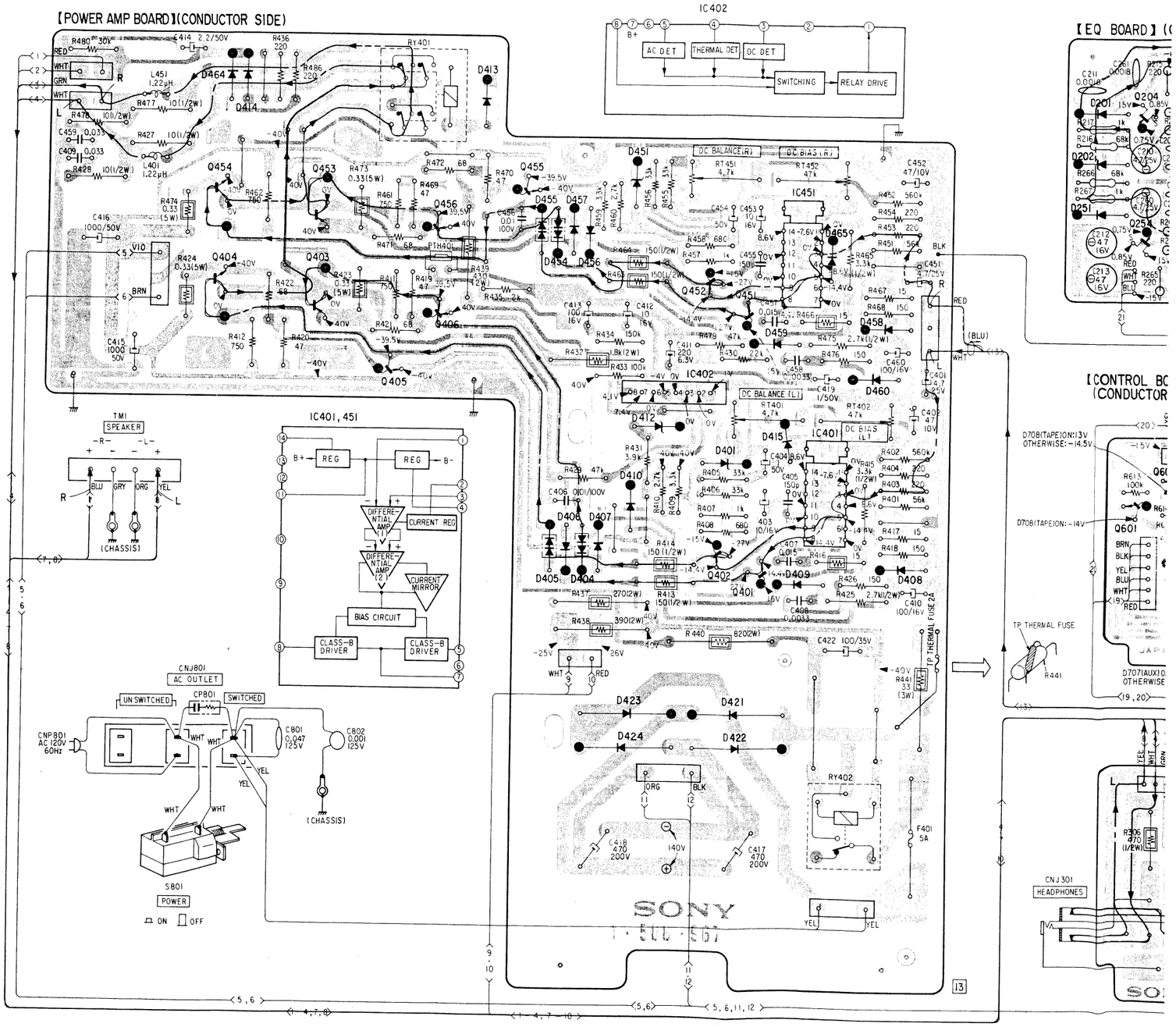
【PULSE POWER SUPPLY BOARD】(CONDUCTOR SIDE)

Q	D
	904
	903
904	
903 901	901 902
902	



Q IC	454 404	453 403	405	456 406	455	IC402	452 402	451 401	IC 451 IC401	204 254 601
D	464, 414			413	455 454, 457 406 456 405 404 407 424	451 410 412 423	401 421 422	459 415 409	465 458 460 408	201 202 251

【POWER AMP BOARD】(CONDUCTOR SIDE)

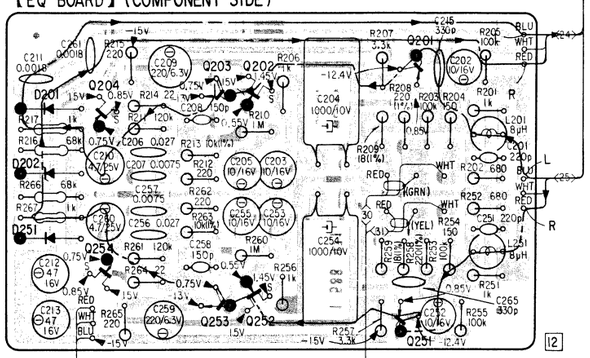


【EQ BOARD】(

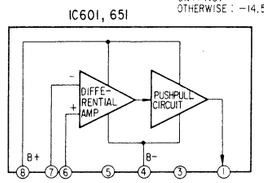
【CONTROL BC
(CONDUCTOR

I	H	G	F	E	D	C	B	A
204 254 602 601	203 202 253 252 603	201 251 604 605	IC651 IC601 501 502 503 IC502	IC501	IC102	IC101	901 902	904 903	Q・IC
201 202 251 601	602	604 606 608 603 605 607	501		701 702 703 704 705 706 707 708 709		902 901	904 903	D

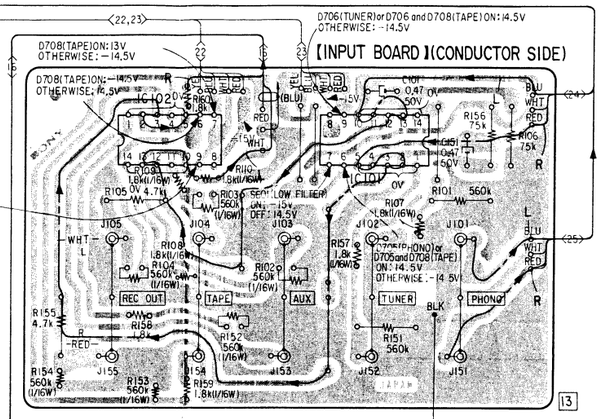
【EQ BOARD】(COMPONENT SIDE)



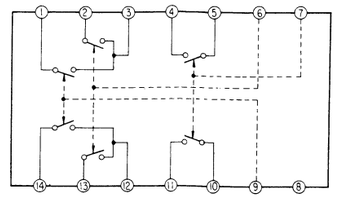
IC601, 651



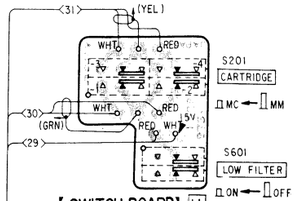
【INPUT BOARD】(CONDUCTOR SIDE)



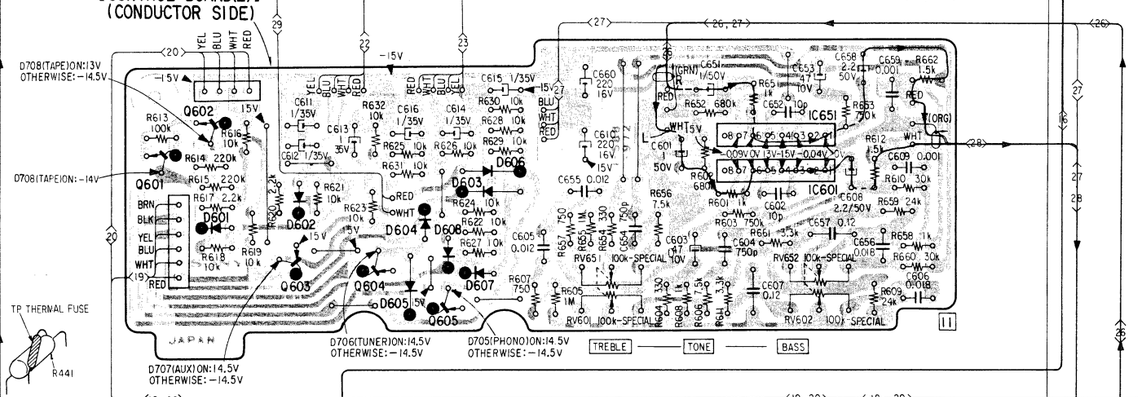
IC101, 102



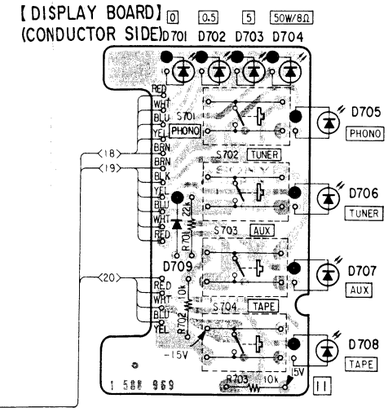
【SWITCH BOARD】(CONDUCTOR SIED)



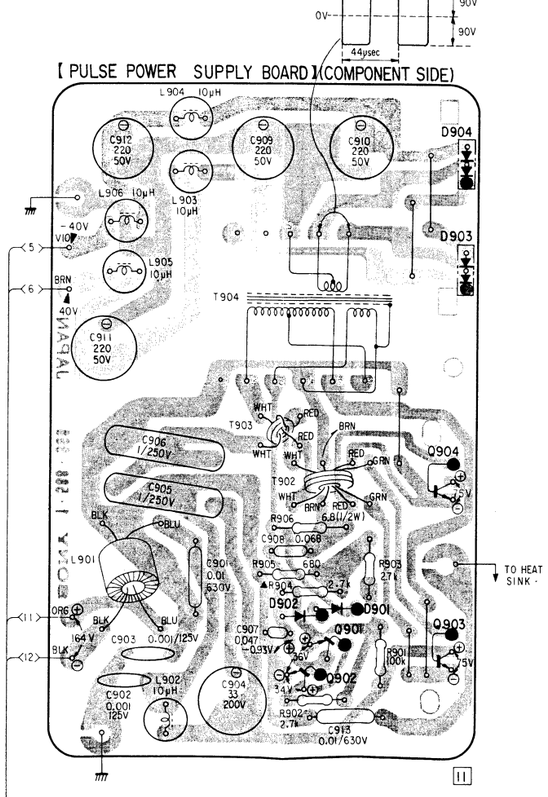
【CONTROL BOARD(2)】(CONDUCTOR SIDE)



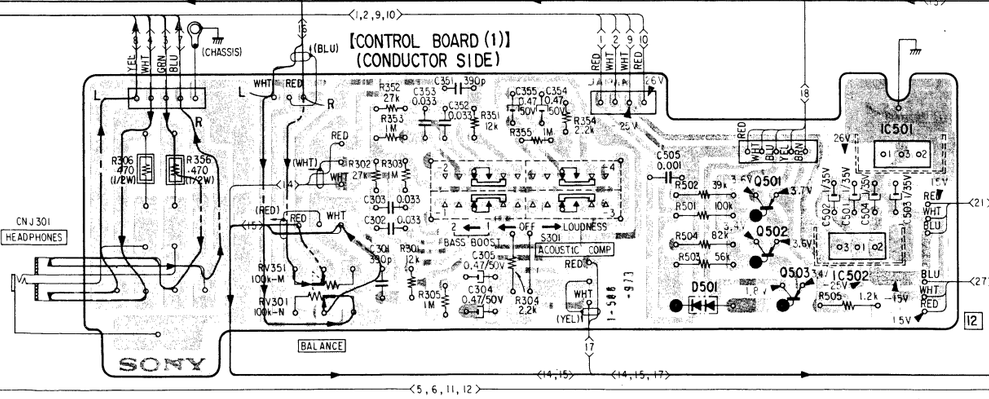
【DISPLAY BOARD】(CONDUCTOR SIDE)



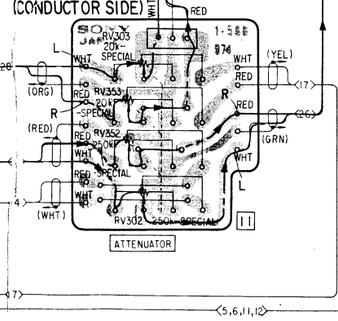
【PULSE POWER SUPPLY BOARD】(COMPONENT SIDE)



【CONTROL BOARD (1)】(CONDUCTOR SIDE)

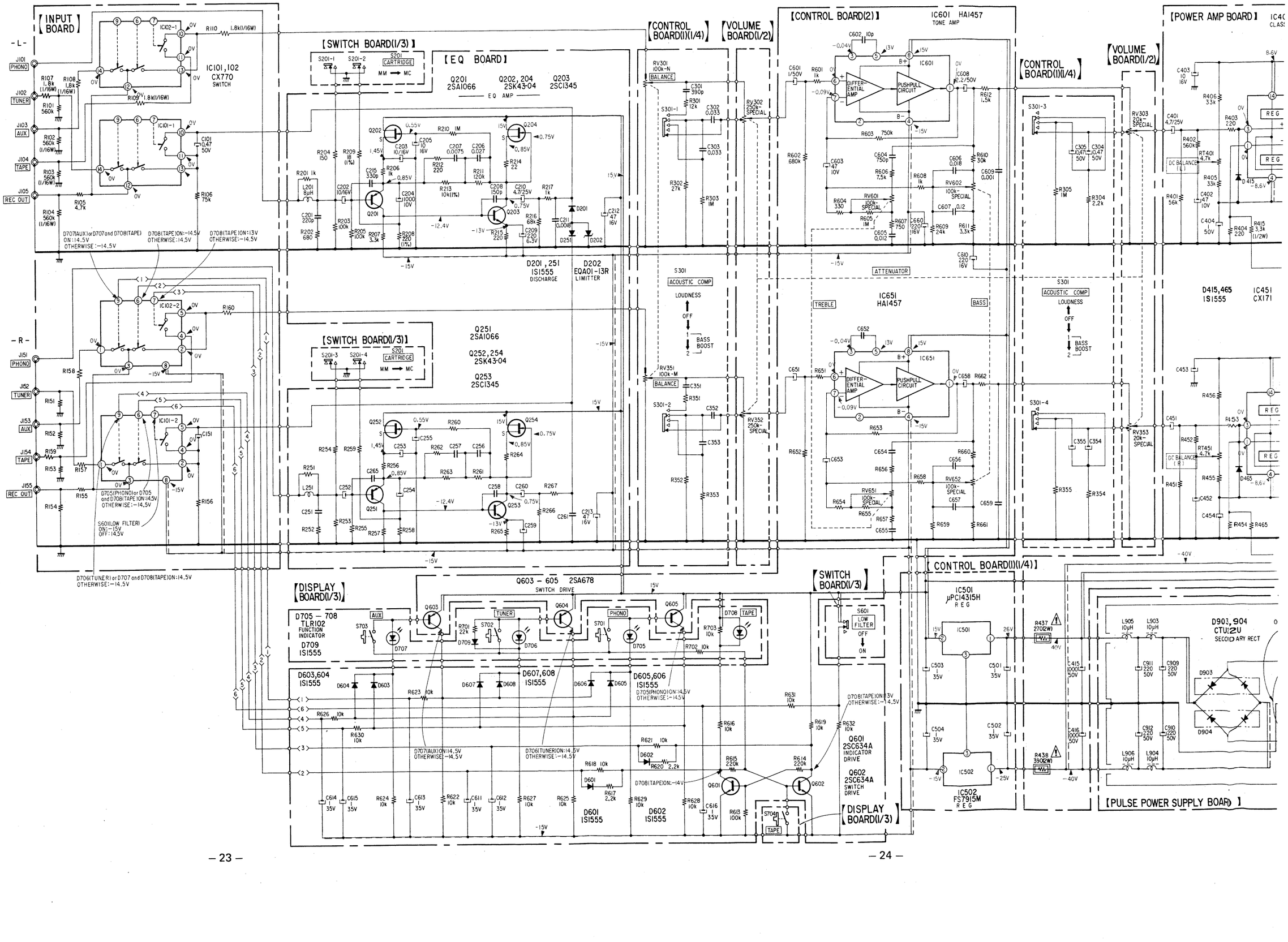


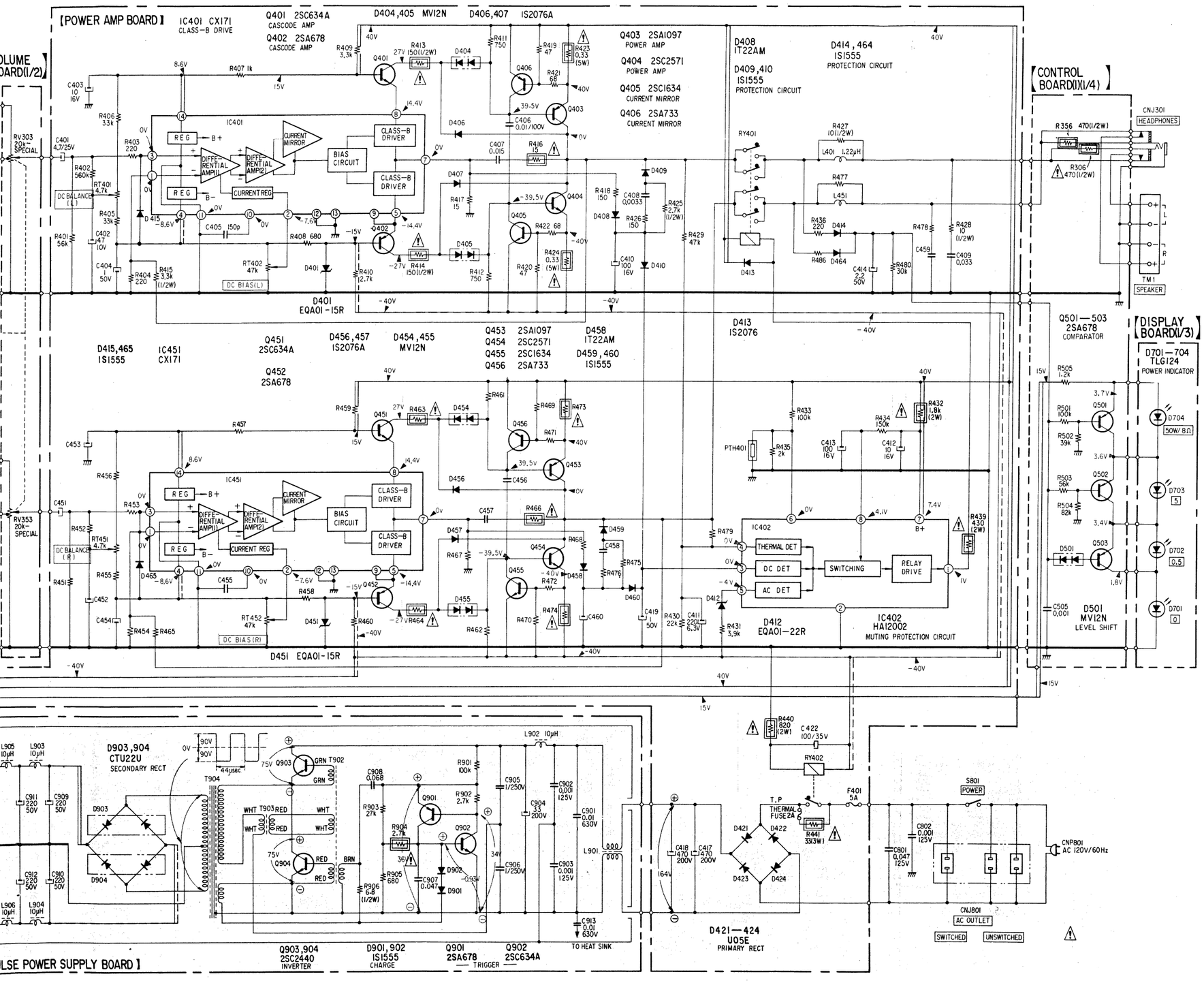
【VOLUME BOARD】(CONDUCTOR SIDE)



4-2. SCHEMATIC DIAGRAM (US model)

US Model





Note:

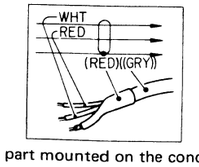
- Component for right channel have same values as for left channel.
- All capacitors are in μF unless otherwise noted. pF = μμF 50 WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ : 1000 Ω; MΩ : 1000 kΩ
- ⚠ : nonflammable resistor.
- Signal Path
  - ——— : B+ bus.
  - — — — : B— bus.
- ▭ : panel designation.
- ▭ : adjustment for repair.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal conditions with a VOM (20 kΩ/V).
- **Switch**

Ref. No.	Switch	Position
S201	CARTRIDGE	MM
S301	ACOUSTIC COMP	OFF
S601	LOW FILTER	OFF
S701	PHONO	OFF
S702	TUNER	OFF
S703	AUX	OFF
S704	TAPE	OFF
S801	POWER	OFF

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note of Mounting Diagram

- Color code of sleeving over the end of the jacket.



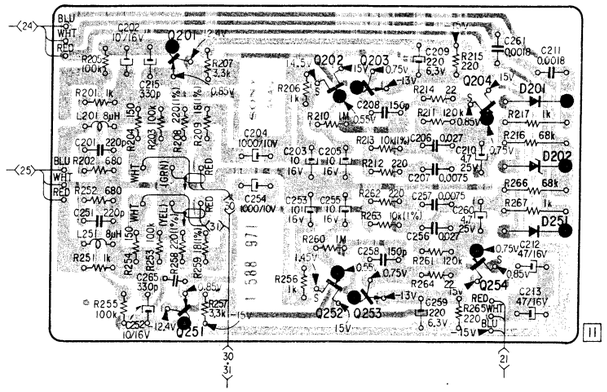
- ■ : part mounted on the conductor side.
- ▭ : B + pattern
- ▭ : B - pattern
- ——→ : signal path
  - ——·→ : L-CH
  - ——··→ : R-CH
- ▲ : nonflammable resistor

4-3. MOUNTING DIAGRAM — *Conductor Side* — (AEP, UK model)

Refer to page 18 for replacement semiconductors and page 34 for note.

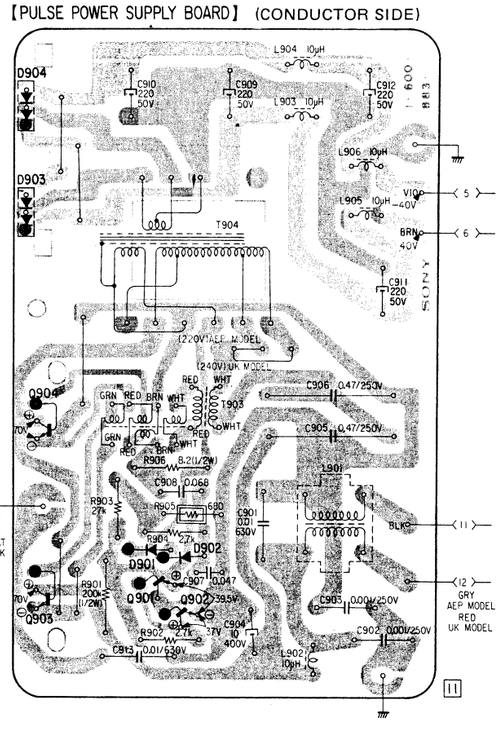
【EQ BOARD】 (CONDUCTOR SIDE)

Q	201 251 202 252 203 253 204 254
D	201 202 251



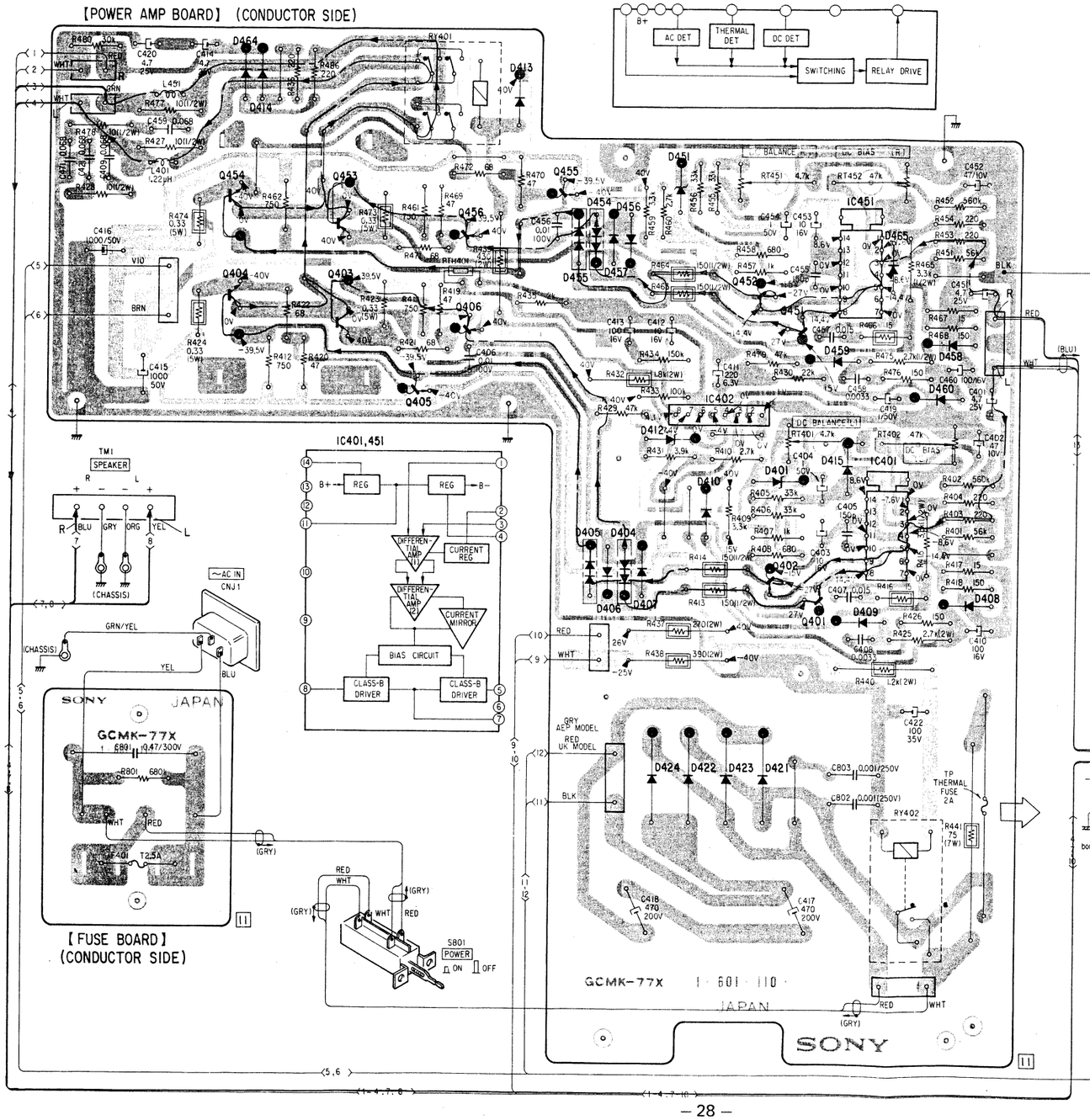
【PULSE POWER SUPPLY BOARD】 (CONDUCTOR SIDE)

Q	D
904	
903	
904	
901 902	
901 903 902	

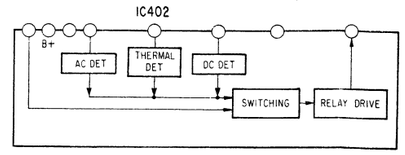


Q · IC	454 404 453 403 405 456 406 455 IC402 452 402 451 401 IC451 IC401 204 254 601 602 203 202 253 252 603
D	454 456 455 457 451 412 413 405 404 406 407 410 401 459 415 409 465 458 460 408 464, 414 424 422 423 421 201 202 251 601 602

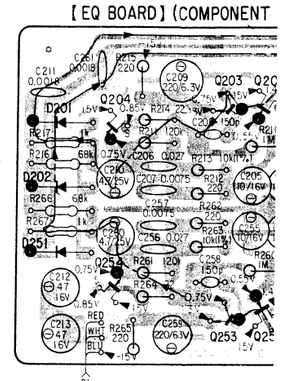
【POWER AMP BOARD】 (CONDUCTOR SIDE)



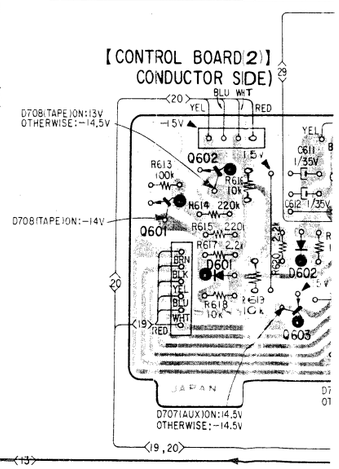
【FUSE BOARD】 (CONDUCTOR SIDE)

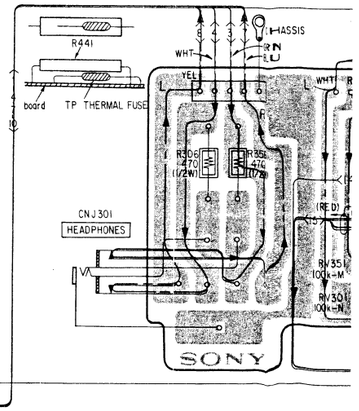


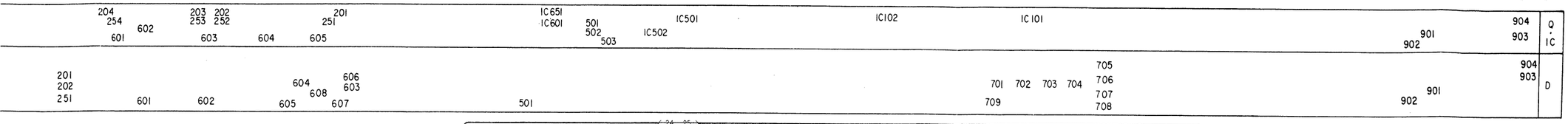
【EQ BOARD】 (COMPONENT



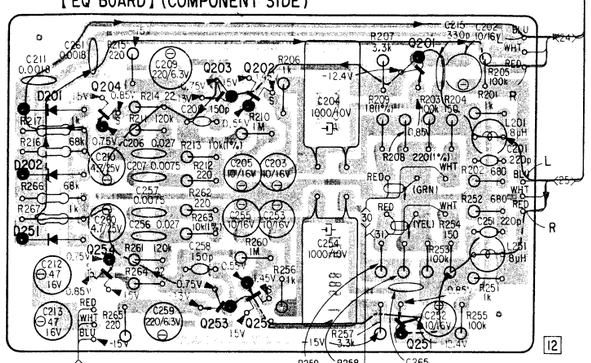
【CONTROL BOARD (2)】 CONDUCTOR SIDE)



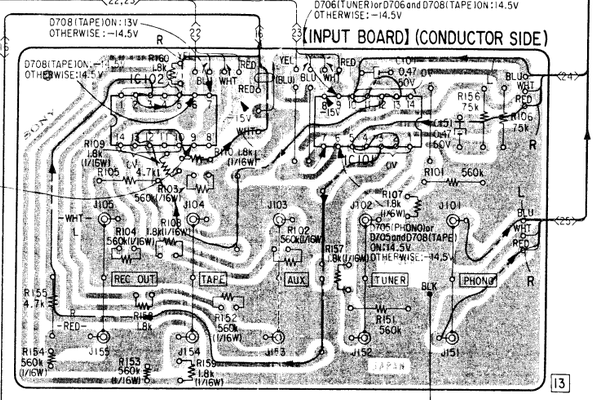




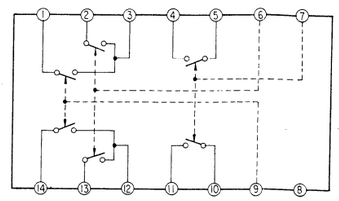
【EQ BOARD】(COMPONENT SIDE)



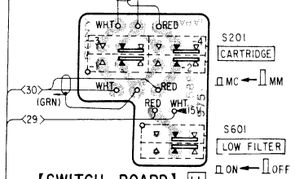
【INPUT BOARD】(CONDUCTOR SIDE)



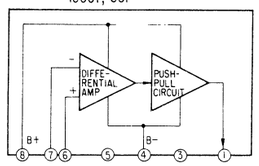
IC101, IC102



【SWITCH BOARD】 11
(CONDUCTOR SIDE)

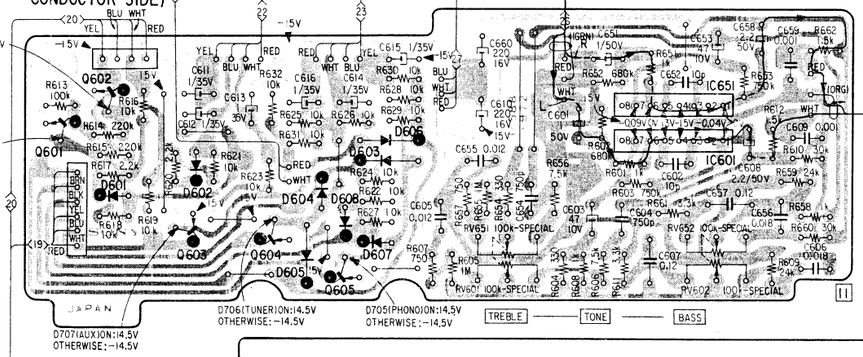


IC601, 651

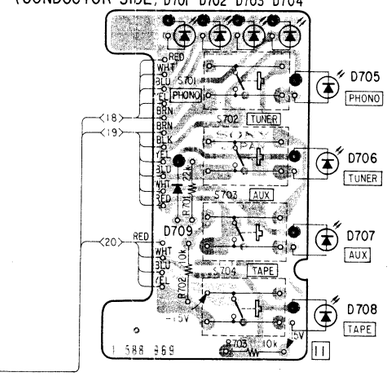


D707(AUX)or D707 and D708(TAPE)
ON:14.5V
OTHERWISE:-14.5V

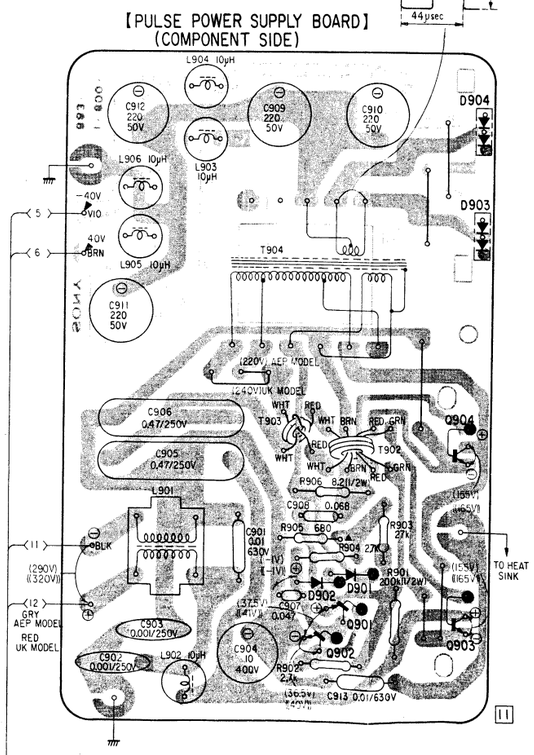
【CONTROL BOARD(2)】
CONDUCTOR SIDE)



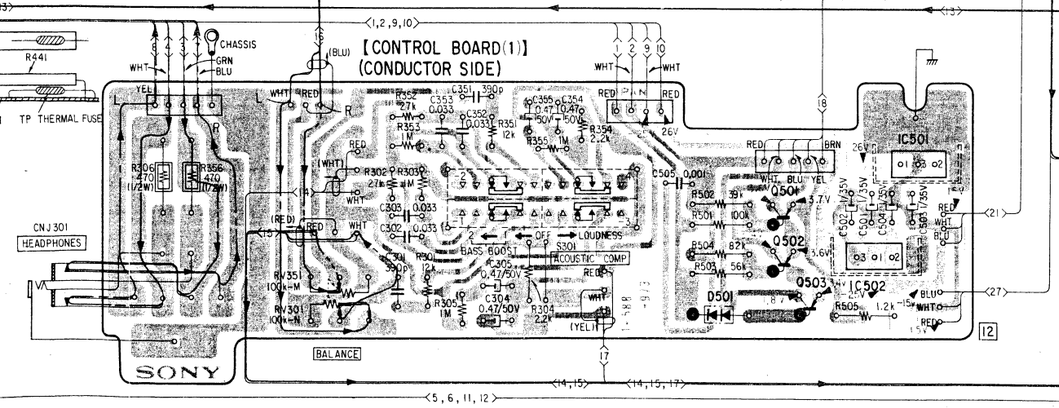
【DISPLAY BOARD】 0 0.5 5 50W/8Ω
(CONDUCTOR SIDE) D701 D702 D703 D704



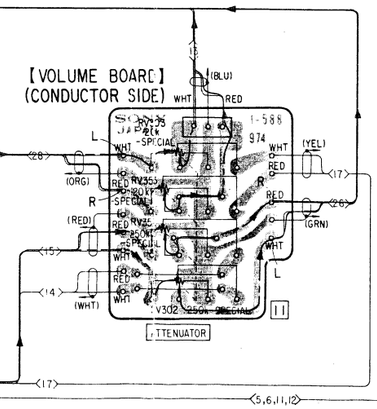
【PULSE POWER SUPPLY BOARD】
(COMPONENT SIDE)



【CONTROL BOARD(1)】
(CONDUCTOR SIDE)

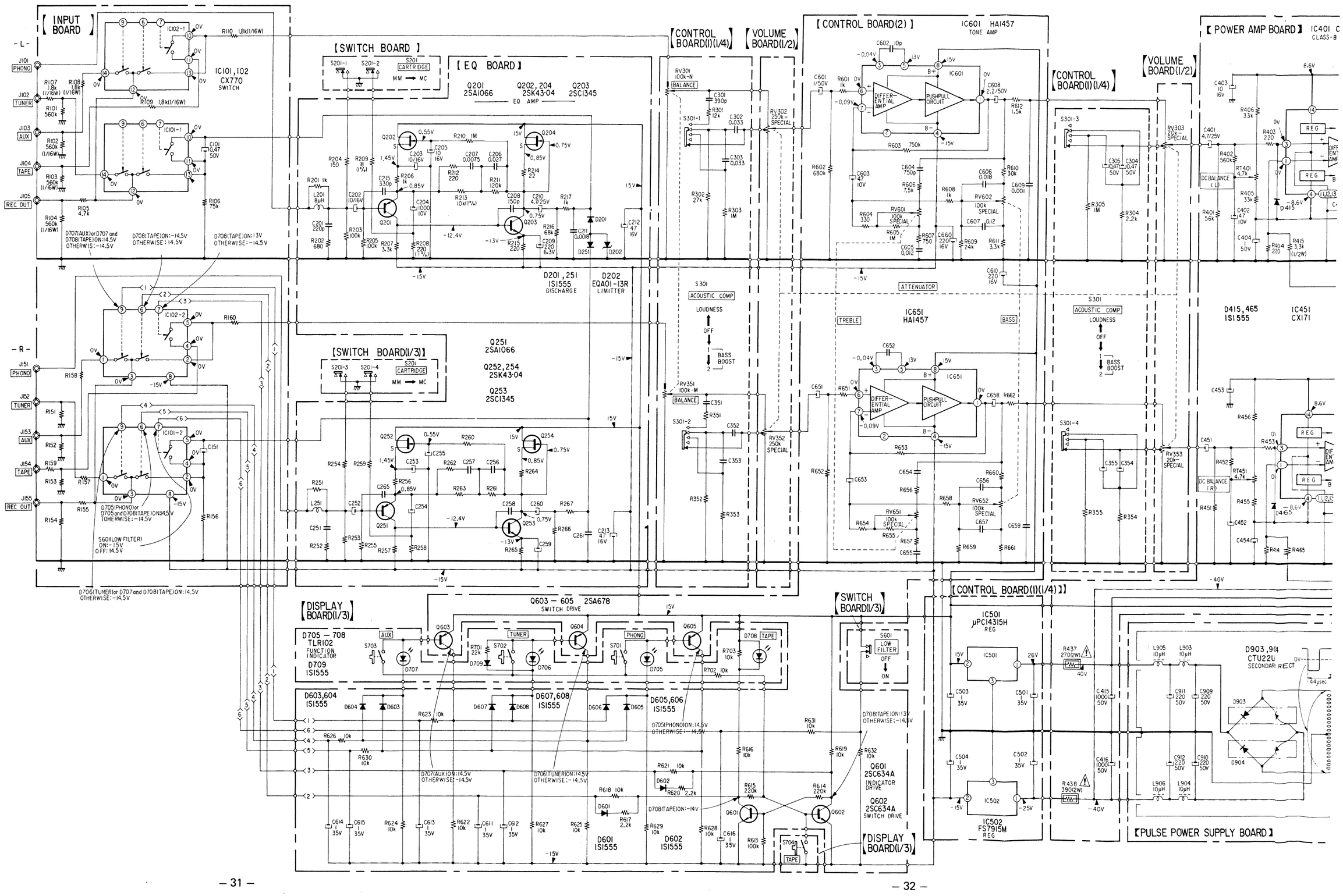


【VOLUME BOARD】
(CONDUCTOR SIDE)

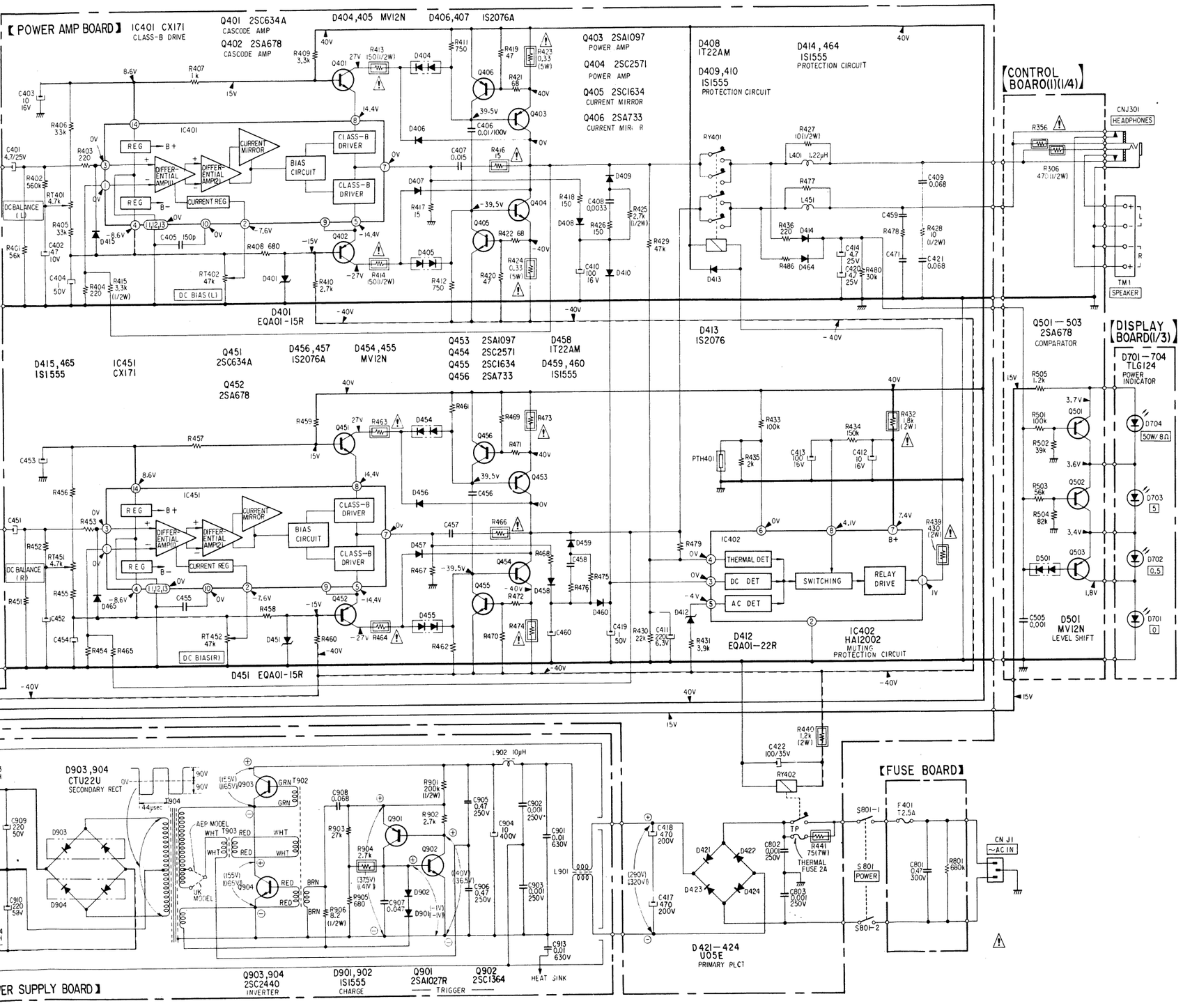


4-4. SCHEMATIC DIAGRAM (AEP, UK model)

AEP, UK Model



AEP, UK Model



Note:

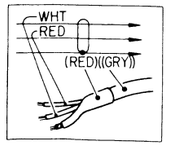
- Component for right channel have same values as for left channel.
- All capacitors are in μF unless otherwise noted. pF = μμF 50 WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ : 1000 Ω; MΩ : 1000 kΩ
- ▭ : nonflammable resistor.
- Signal Path
  ——— : B+ bus.
  — — — : B− bus.
- ▭ : panel designation.
- ▭ : adjustment for repair.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal conditions with a VOM (20 kΩ/V).
  No mark : common
  ( ) : AEP model (power supply : 220V)
  (( )) : UK model (power supply : 240V)
- Switch

Ref. No.	Switch	Position
S201	CARTRIDGE	MM
S301	ACOUSTIC COMP	OFF
S601	LOW FILTER	OFF
S701	PHONO	OFF
S702	TUNER	OFF
S703	AUX	OFF
S704	TAPE	OFF
S801	POWER	OFF

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note of Mounting Diagram

- Color code of sleeving over the end of the jacket.

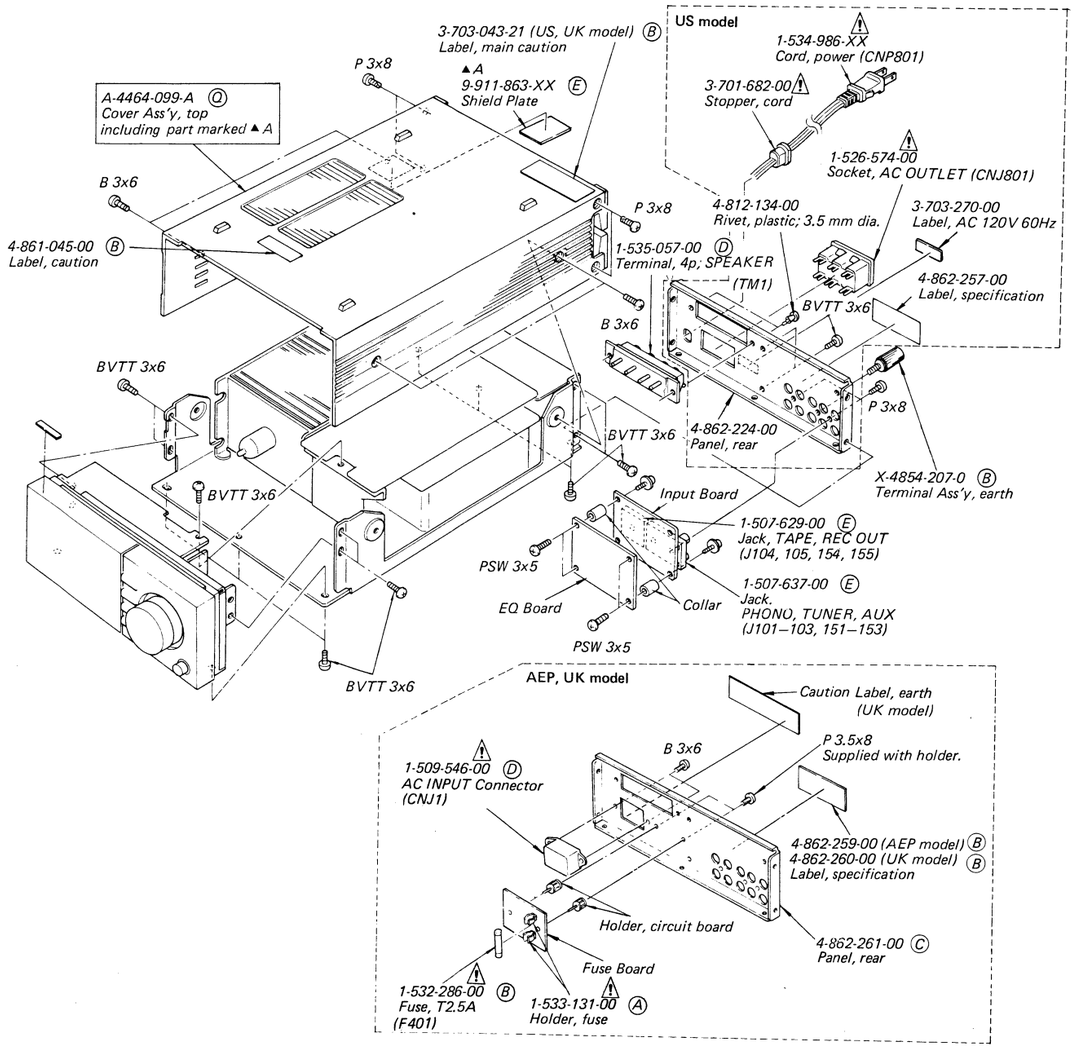


- ■ : part mounted on the conductor side.
- ▭ : B + pattern
- ▭ : B− pattern
- —▸— : signal path
  —·▸— : L-CH
  —··▸— : R-CH
- ▲ : nonflammable resistor

SECTION 5
EXPLODED VIEWS

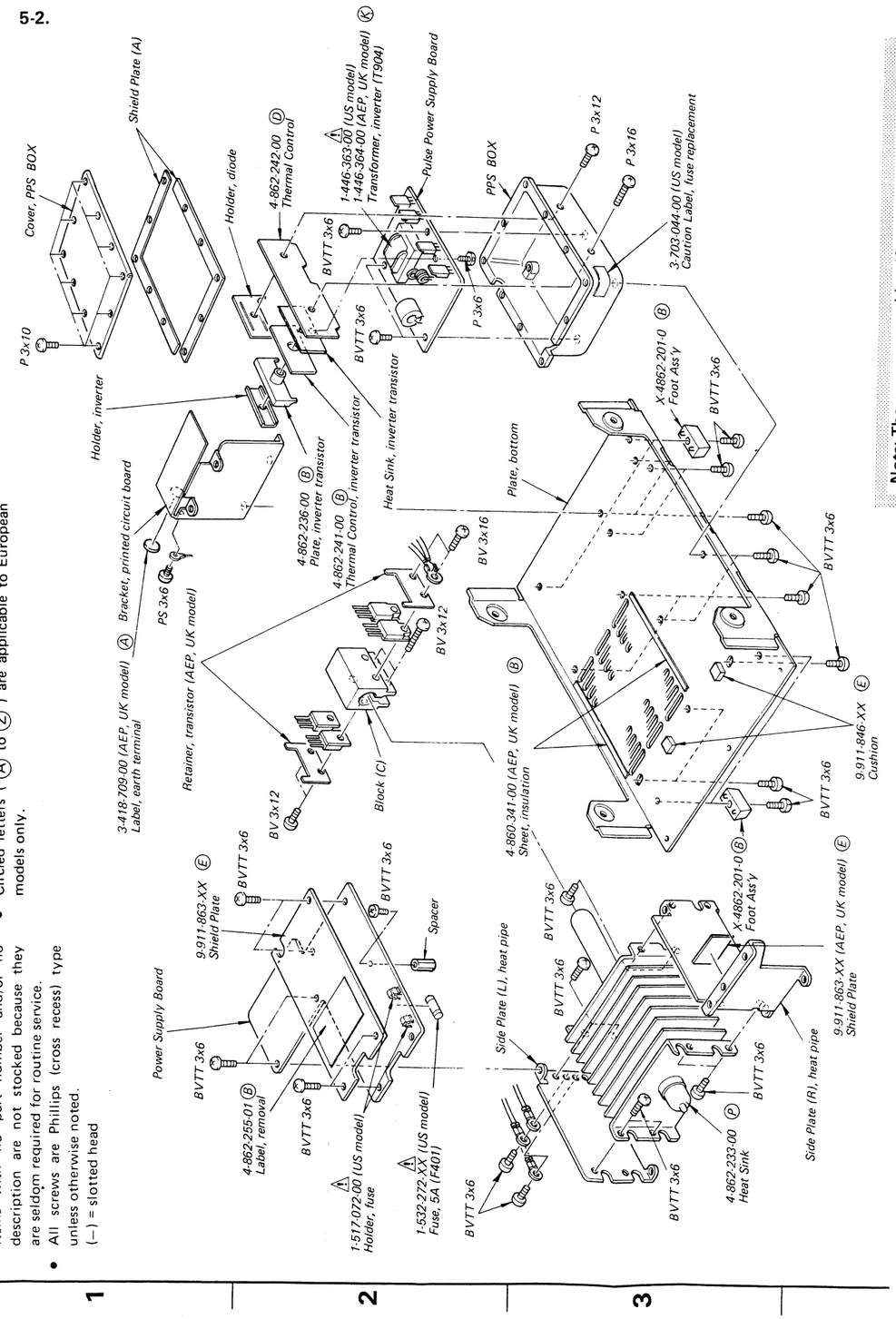
5-1.

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.



Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

5-2.

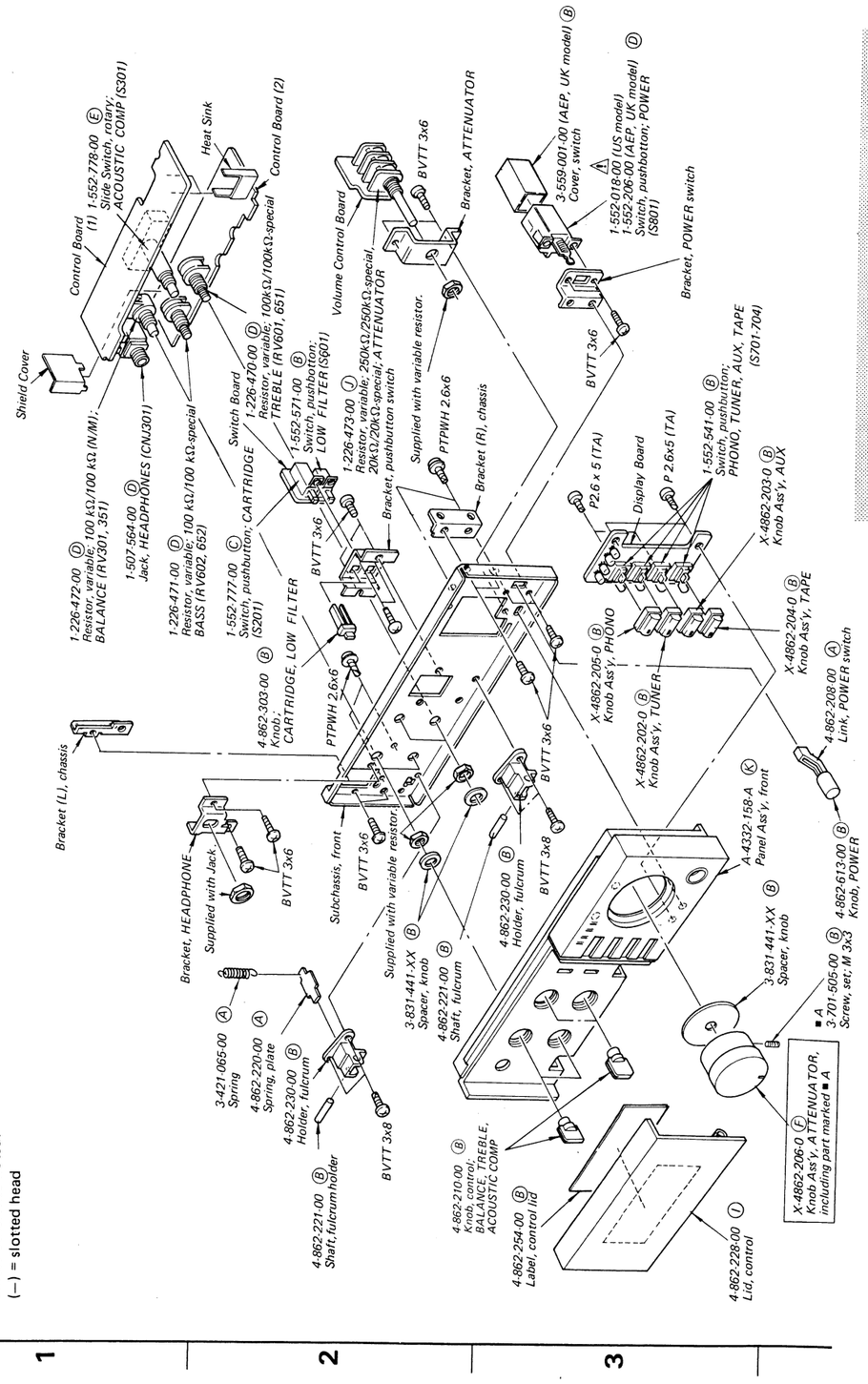


Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

5-3.

5-3.


Control Board (1)
1-552-778-00 (E) Slide Switch, rotary; ACOUSTIC COMP (S301)
Heat Sink
Control Board (2)
Shield Cover
1-226-472-00 (D) Resistor, variable; 100 kΩ/100 kΩ (N/M); BALANCE (RV301, 351)
1-507-564-00 (D) Jack, HEADPHONES (CNJ301)
1-226-471-00 (D) Resistor, variable; 100 kΩ/100 kΩ-special BASS (RV602, 652)
1-552-777-00 (C) Switch, pushbutton; CARTRIDGE (S201)
Switch Board
1-226-470-00 (D) Resistor, variable; 100kΩ/100kΩ-special TREBLE (RV601, 651)
1-552-571-00 (B) Switch, pushbutton; LOW FILTER (S601)
Volume Control Board
1-226-473-00 (I) Resistor, variable; 250kΩ/250kΩ-special, 20kΩ/20kΩ-special; ATTENUATOR
Supplied with variable resistor.
Bracket, pushbutton switch
PTPWH 2.6x6
Bracket (R), chassis
BVTT 3x6
Bracket, ATTENUATOR
3-559-001-00 (AEP, UK model) (B) Cover, switch
1-552-018-00 (US model)
1-552-206-00 (AEP, UK model) (D) Switch, pushbutton; POWER (S801)
Bracket, POWER switch
BVTT 3x6
P2.6 x 5 (TA)
Display Board
P 2.6x5 (TA)
1-552-541-00 (B) Switch, pushbutton; PHONO, TUNER, AUX, TAPE (S701-704)
X-4862-203-0 (B) Knob Ass'y, AUX
X-4862-204-0 (B) Knob Ass'y, TAPE
X-4862-205-0 (B) Knob Ass'y, PHONO
X-4862-202-0 (B) Knob Ass'y, TUNER
4-862-208-00 Link, POWER switch
4-862-303-00 (B) Knob; CARTRIDGE, LOW FILTER
PTPWH 2.6x6
BVTT 3x6
BVTT 3x8
Bracket (L), chassis
Bracket, HEADPHONE
Supplied with Jack
BVTT 3x6
Subchassis, front
BVTT 3x6
Supplied with variable resistor.
4-862-230-00 (B) Holder, fulcrum
BVTT 3x8
A 4332-158-A (K) Panel Ass'y, front
4-862-613-00 (B) Knob, POWER
3-831-441-XX (B) Spacer, knob
4-862-221-00 (B) Shaft, fulcrum
3-831-441-XX (B) Spacer, knob
3-831-065-00 (A) Spring
4-862-220-00 (A) Spring, plate
4-862-230-00 (B) Holder, fulcrum
4-862-221-00 (B) Shaft, fulcrum holder
BVTT 3x8
3-831-065-00 (A) Spring
4-862-220-00 (A) Spring, plate
4-862-230-00 (B) Holder, fulcrum
4-862-221-00 (B) Shaft, fulcrum holder
BVTT 3x8
4-862-210-00 (B) Knob, control; BALANCE, TREBLE, ACOUSTIC COMP
4-862-254-00 (B) Label, control lid
4-862-228-00 (I) Lid, control
3-831-441-XX (B) Spacer, knob
3-831-441-XX (B) Spacer, knob
■ A 3-701-505-00 (B) Screw, set; M 3x3
X-4862-206-0 (F) Knob Ass'y, ATTENUATOR, including part marked ■ A

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

SECTION 6
ELECTRICAL PARTS LIST

- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	Part No.		Description
			SEMICONDUCTORS
			Transistors
Q201, 251	8-765-523-00	Ⓒ	2SA1066
Q202, 252	8-723-304-00	Ⓒ	2SK43-04
Q203, 253	8-729-334-58	Ⓑ	2SC1345
Q204, 254	8-723-304-00	Ⓒ	2SK43-04
⇒ Q401, 451	8-729-663-47	Ⓑ	2SC1364
⇒ Q402, 452	8-729-612-77	Ⓑ	2SA1027R
Q403, 453	8-729-397-22	Ⓘ	2SA1097
Q404, 454	8-729-371-22	Ⓖ	2SC2571
⇒ Q405, 455	8-729-663-47	Ⓑ	2SC1364
⇒ Q406, 456	8-729-612-77	Ⓑ	2SA1027R
⇒ Q501–503	8-729-612-77	Ⓑ	2SA1027R
⇒ Q601, 602	8-729-663-47	Ⓑ	2SC1364
⇒ Q603–605	8-729-612-77	Ⓑ	2SA1027R
⇒ Q901	⚠8-729-612-77	Ⓑ	2SA1027R
⇒ Q902	⚠8-729-663-47	Ⓑ	2SC1364
Q903, 904	⚠8-729-924-40	Ⓕ	2SC2440
			ICs
IC101, 102	8-757-700-00	Ⓖ	CX770
IC401, 451	8-751-710-00	Ⓗ	CX171
IC402	8-759-320-02	Ⓔ	HA12002
IC501	8-759-143-15	Ⓕ	μPC14315H
IC502	8-759-379-15	Ⓙ	FS7915M
IC601, 651	8-759-314-57	Ⓒ	HA1457
			Diodes
D201, 251	8-719-815-55	Ⓑ	1S1555
⇒ D202	8-719-931-13	Ⓑ	EQB01-13
⇒ D401, 451	8-719-931-15	Ⓑ	EQB01-15
D404, 454 D405, 455	8-719-912-00	Ⓑ	MV12N
D406, 456 D407, 457	8-719-923-76	Ⓑ	1S2076A
D408, 458	8-719-422-21	Ⓑ	1T22AM
D409, 459 D410, 460	8-719-815-55	Ⓑ	1S1555
⇒ D412	8-719-931-22	Ⓑ	EQB01-22
⇒ D413	8-719-815-55	Ⓑ	1S1555
D414, 464 D415, 465	8-719-815-55	Ⓑ	1S1555
⇒ D421–424	⚠8-719-911-55	Ⓒ	U05G
D501	8-719-912-00	Ⓑ	MV12N
D601–608	8-719-815-55	Ⓑ	1S1555
D701–704	8-719-812-43	Ⓑ	TLG124
D705–708	8-719-801-02	Ⓑ	TLR102
D709	8-719-815-55	Ⓑ	1S1555
D901, 902	⚠8-719-815-55	Ⓑ	1S1555
D903, 904	⚠8-719-300-22	Ⓓ	CTU22U
			Thermistor
PTH401	1-800-427-00	Ⓑ	Positive
			COILS and TRANSFORMER
L201, 251	1-407-519-00	Ⓑ	Microinductor, 8μH
L901	⚠1-421-328-11		Coil, line filter (US model)
	⚠1-421-340-00	Ⓔ	Coil, line filter (AEP, UK model)
L902–906	⚠1-421-329-00	Ⓑ	Coil, choke; 10μH
T902	⚠1-543-098-00	Ⓑ	Core
T903	⚠1-543-100-00	Ⓑ	Core
T904	⚠1-446-363-00		Transformer, inverter (US model)
	⚠1-446-364-00	Ⓚ	Transformer, inverter (AEP, UK model)

CAPACITORS

All capacitors are in μF and ceramic unless otherwise noted. 50WV or less are not indicated except for electrolytics or tantalums. p: μμF, elect: electrolytic

C101, 151	1-121-911-00	Ⓑ	0.47	50V	elect
C201, 251	1-102-978-00	Ⓐ	220p		
C202, 252 C203, 253	1-121-651-00	Ⓑ	10	16V	elect
C204, 254	1-121-736-00	Ⓑ	1000	10V	elect
C205, 255	1-121-651-00	Ⓑ	10	16V	elect
C206, 256	1-108-589-00	Ⓑ	0.027		mylar
C207, 257	1-108-576-00	Ⓑ	0.0075		mylar
C208, 258	1-101-361-00	Ⓐ	150p		

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

- ⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	Part No.		Description
C209, 259	1-121-419-00	Ⓑ 220	6.3V elect
C210, 260	1-123-332-00	Ⓑ 4.7	25V elect
C211, 261	1-108-561-00	Ⓑ 0.0018	mylar
C212, 213	1-121-409-00	Ⓑ 47	16V elect
C215, 265	1-102-820-00	Ⓐ 330p	
C301, 351	1-102-822-00	Ⓐ 390p	
C302, 352 C303, 353	1-108-244-00	Ⓑ 0.033	mylar
C304, 354 C305, 355	1-121-911-00	Ⓑ 0.47	50V elect
C401, 451	1-121-395-00	Ⓑ 4.7	25V elect
C402, 452	1-121-352-00	Ⓑ 47	10V elect
C403, 453	1-121-651-00	Ⓑ 10	16V elect
C404, 454	1-121-391-00	Ⓑ 1	50V elect
C405, 455	1-101-361-00	Ⓐ 150p	
C406, 456	1-108-377-00	Ⓐ 0.01	100V mylar
C407, 457	1-108-240-00	Ⓐ 0.015	mylar
C408, 458	1-108-232-00	Ⓐ 0.0033	mylar
C409, 459	1-108-244-00	0.033	mylar (US model)
	1-108-249-00	Ⓑ 0.068	mylar (AEP, UK model)
C410, 460	1-123-320-00	Ⓑ 100	16V elect
C411	1-121-419-00	Ⓑ 220	6.3V elect
C412	1-121-651-00	Ⓑ 10	16V elect
C413	1-123-320-00	Ⓑ 100	16V elect
C414	1-121-450-00	2.2	50V elect (US model)
	1-121-395-00	Ⓑ 4.7	25V elect (AEP, UK model)
C415, 416	1-123-061-00	Ⓒ 1000	50V elect
C417, 418	⚠1-125-178-00	Ⓕ 470	200V elect
C419	1-121-391-00	Ⓑ 1	50V elect
C420	1-121-395-00	Ⓑ 4.7	25V elect (AEP, UK model)
C421, 471	1-108-249-00	Ⓑ 0.068	50V mylar (AEP, UK model)
C422	1-123-345-00	Ⓑ 100	35V elect
C501–504	1-131-215-00	Ⓑ 1	35V tantalum
C505	1-101-001-00	Ⓐ 0.001	
C601, 651	1-121-391-00	Ⓑ 1	50V elect
C602, 652	1-102-947-00	Ⓐ 10p	
C603, 653	1-121-927-00	Ⓑ 47	10V elect
C604, 654	1-104-074-00	Ⓑ 750p	stylol
C605, 655	1-108-357-00	Ⓐ 0.012	mylar
C606, 656	1-108-358-00	Ⓐ 0.018	mylar
C607, 657	1-108-363-00	Ⓑ 0.12	mylar
C608, 658	1-121-450-00	Ⓑ 2.2	50V elect
C609, 659	1-108-227-00	Ⓐ 0.001	mylar
C610,660	1-123-321-00	Ⓑ 220	16V elect
C611–616	1-131-215-00	Ⓑ 1	35V tantalum
C801	⚠1-108-749-00	0.047	125V mylar (US model)
	⚠1-130-342-00	Ⓒ 0.47	300V film (AEP, UK model)
C802	⚠1-161-516-00	0.001	125V (US model)
C802, 803	⚠1-102-222-00	Ⓑ 0.001	250V (AEP, UK model)
C901	⚠1-130-141-00	Ⓑ 0.01	630V film
C902, 903	⚠1-161-516-00	Ⓑ 0.001	125V (US model)
	⚠1-102-222-00	Ⓑ 0.001	250V (AEP, UK model)
C904	⚠1-123-565-00	33	200V elect (US model)
	⚠1-123-290-00	Ⓗ 10	400V elect (AEP, UK model)
C905, 906	⚠1-130-357-00	1	250V film (US model)
	⚠1-130-356-00	Ⓑ 0.47	250V film (AEP, UK model)
C907	⚠1-108-595-00	Ⓑ 0.047	mylar
C908	⚠1-108-599-00	Ⓑ 0.068	mylar
C909–912	⚠1-123-361-00	Ⓑ 220	50V elect
C913	⚠1-130-141-00	Ⓑ 0.01	630V film

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

RESISTORS

All resistors are in ohms. Common ¼W carbon resistors are omitted. Refer to the list on the last page for their part numbers.

R102–104 R152–154	1-211-695-00	Ⓐ 560k	$^1/_{16}$W micro
R107–110 R157–160	1-209-878-00	Ⓐ 1.8k	$^1/_{16}$W micro
R208, 258	1-214-116-00	Ⓐ 220	¼W (1%) metal oxide
R209, 259	1-214-090-00	Ⓐ 18	¼W (1%) metal oxide

• Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	Part No.			Description
R213, 263	1-214-156-00	Ⓐ	10k	¼W(1%) metal oxide
R306, 356	⚠1-247-232-00	Ⓐ	470	½W carbon (nonflammable)
R413, 463 R414, 464	⚠1-247-220-00	Ⓐ	150	½W carbon (nonflammable)
R415, 465	1-244-885-00	Ⓐ	3.3k	½W carbon
R416, 466	⚠1-247-087-00	Ⓐ	15	¼W carbon (nonflammable)
R423, 473 R424, 474	⚠1-217-157-00	Ⓑ	0.33	5W wirewound (nonflammable)
R425, 475	1-244-883-00	Ⓐ	2.7k	½W carbon
R427, 477 R428, 478	1-244-825-00	Ⓐ	10	½W carbon
R432	⚠1-206-670-00	Ⓑ	1.8k	2W metal oxide (nonflammable)
R437	⚠1-206-650-00	Ⓑ	270	2W metal oxide (nonflammable)
R438	⚠1-206-654-00	Ⓑ	390	2W metal oxide (nonflammable)
R439	⚠1-206-655-00	Ⓑ	430	2W metal oxide (nonflammable)
R440	⚠1-206-662-00		820	2W metal oxide (US model) (nonflammable)
	⚠1-206-666-00	Ⓑ	1.2k	2W metal oxide (AEP, UK model) (nonflammable)
R441	⚠1-206-523-00	Ⓑ	33	3W metal oxide (US model) (nonflammable)
	⚠1-217-593-00	Ⓑ	75	7W wirewound (AEP, UK model) (nonflammable)
R801	⚠1-246-541-00	Ⓐ	680k	¼W carbon (AEP, UK model)
R901	⚠1-246-521-00		100k	¼W carbon (US model)
	⚠1-244-928-00	Ⓐ	200k	½W carbon (AEP, UK model)
R902	⚠1-246-483-00	Ⓐ	2.7k	¼W carbon
R903	⚠1-246-507-00	Ⓐ	27k	¼W carbon
R904	⚠1-211-553-00	Ⓐ	2.7k	¼W carbon (nonflammable)
R905	⚠1-246-469-00	Ⓐ	680	¼W carbon
R906	⚠1-244-821-00		6.8	½W carbon (US model)
	⚠1-244-823-00	Ⓐ	8.2	½W carbon (AEP, UK model)
RT401, 451	1-224-644-XX	Ⓑ	4.7k-B; adjustable, DC balance	
RT402, 452	1-224-647-XX	Ⓑ	47k-B; adjsutable, DC bias	
RV301, 351	1-226-472-00	Ⓓ	100k-N/100k-M, variable; BALANCE	
RV302, 352 RV303, 353	1-226-473-00	Ⓙ	250k/250k-special, 20k/20k-special; variable; ATTENUATOR	
RV601, 651	1-226-470-00	Ⓓ	100k/100k-special, variable; TREBLE	
RV602, 652	1-226-471-00	Ⓓ	100k/100k-special, variable, BASS	

SWITCHES

S201	1-552-777-00	Ⓒ	Pushbutton, CARTRIDGE
S301	1-552-778-00	Ⓔ	Rotary-slide, ACOUSTIC COMP
S601	1-552-571-00	Ⓑ	Pushbutton, LOW FILTER
S701–704	1-552-541-00	Ⓑ	Pushbutton, PHONO, TUNER, AUX, TAPE
S801	⚠1-552-018-00		Pushbutton, POWER (US model)
	⚠1-552-206-00	Ⓓ	Pushbutton, POWER (AEP, UK model)

JACKS

J101–103 J151–153	1-507-637-00	Ⓔ	PHONO, TUNER, AUX
J104, 154 J105, 155	1-507-629-00	Ⓔ	TAPE, REC OUT
CNJ301	1-507-564-00	Ⓓ	HEADPHONES

• Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	*Part No.*	*Description*
		MISCELLANEOUS
CNJ1	⚠1-509-546-00	Ⓓ Connector, AC INPUT (AEP, UK model)
CNJ801	⚠1-526-574-00	Socket, AC OUTLET (US model)
CNP801	⚠1-534-986-XX	Cord, power (US model)
F401	⚠1-532-272-XX	Fuse, 5A (US model)
	⚠1-532-286-00	Ⓑ Fuse, T2.5A (AEP, UK model)
RY401	1-515-302-00	Ⓕ Relay
RY402	⚠1-515-278-00	Relay (US model)
	⚠1-515-347-00	Ⓕ Relay (AEP, UK model)
TMI	1-535-057-00	Ⓓ Terminal, 4p; SPEAKER
TP	⚠1-532-556-00	Ⓑ Fuse, thermal; 2A
	⚠1-517-072-00	Holder, fuse (US model)
	⚠1-533-131-00	Ⓐ Holder, fuse (AEP, UK model)

ACCESSORIES AND PACKING MATERIALS

Part No.	*Description*
⚠1-534-819-00	Ⓗ Cord, power (UK model)
3-701-625-00	Ⓐ Bag, plastic
3-770-741-11	Ⓗ Manual, instruction (AEP, UK model)
3-770-741-21	Manual, instruction (US model)
3-794-233-21	Sheet, instruction (US model)
4-862-251-00	Ⓐ Sheet, protection
4-862-351-00	Ⓑ Cushion, front
4-862-352-00	Ⓑ Cushion, rear
4-862-353-00	Ⓑ Bag, protection

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

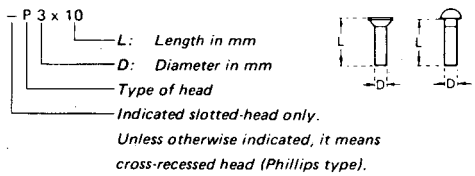
1/4 WATT CARBON RESISTORS Ⓐ

Note: Circled letter Ⓐ is applicable to European models only.

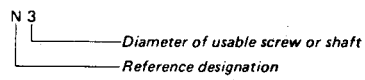
Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-576-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-577-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-578-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-579-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-580-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-581-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-582-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-583-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-584-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-585-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-586-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-587-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

HARDWARE NOMENCLATURE

Screw:



Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
		SCREWS	
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

Reference Designation	Shape	Description	Remarks
		SELF-TAPPING SCREWS	
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
		SET SCREWS	
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
		NUT	
N		nut	
		WASHERS	
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
		RETAINING RINGS	
E		retaining ring	
G		grip-type retaining ring	

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